MIT LIBRARIES TRIP
3 9080 02414 3593

GEOLOGICAL RESEARCH IN KENTUCKY

WILLARD ROUSE JILLSON

LIBRARY
OF THE
MASSACHUSETTS INSTITUTE
OF TECHNOLOGY

Kentucky Geological Survey

WILLARD ROUSE JILLSON
DIRECTOR AND STATE GEOLOGIST

SERIES SIX
VOLUME FIFTEEN

Geological Research in Kentucky

1923

THE KENTUCKY GEOLOGICAL SURVEY
1838-1923

CHRONOLOGY OF DIRECTORS AND STATE GEOLOGISTS

I

WILLIAM WILLIAMS MATHER, A. M., LL. D. (1804-1859),
Geologist, Chemist, Soldier, Teacher, Author
(1838-1839)

II.

DAVID DALE OWEN, M. D. (1807-1860),
Geologist, Author, Physician
(1852-1857)

III.

NATHANIEL SOUTHGATE SHALER, A. B., S. D., LL. D.,
Geologist, Author, Teacher, Soldier
(1873-1880)

IV.

JOHN ROBERT PROCTER (1844-1903),
Administrator, Civil Service Reformer, Author
(1880-1892)

V.

CHARLES JOSEPH NORWOOD, M. S. (1853——),
Engineer, Geologist, Teacher, Author
(1904 1912).

VI.

JOSEPH BERNARD HOEING, C. E. (1855——),
Engineer, Geologist, Cartograher, Author
(1912-1918).

VII.

WILLARD ROUSE JILLSON, B. S., M. S., Sc. D. (1890——),
Geologist, Author, Teacher, Engineer
(1919——).

557.69
K37r

MASS. INST. TECH.
APR 23 1924
LIBRARY

GEOLOGICAL RESEARCH IN KENTUCKY

A summary account of the several geological surveys of Kentucky,
including a complete list of their publications and a
general bibliography of 806 titles pertaining to Kentucky geology

BY

WILLARD ROUSE JILLSON

DIRECTOR AND STATE GEOLOGIST OF THE KENTUCKY GEOLOGICAL SURVEY,
PRESIDENT OF THE KENTUCKY ACADEMY OF SCIENCE, CHAIRMAN
OF THE KENTUCKY STATE PARK COMMISSION, AND
CURATOR OF THE STATE MUSEUM.

Ten Illustrations and Maps

FIRST EDITION
500 COPIES

THE KENTUCKY GEOLOGICAL SURVEY
FRANKFORT, KY.
1923

Copyright, 1924, by
WILLARD ROUSE JILLSON

All Rights Reserved

STATE JOURNAL PRINT
Frankfort, Ky.

Illustrations

Page
1. Dr. William Williams Mather (1804-1859) 5
2. Dr. David Dale Owen (1807-1860) 9
3. Dr Nathaniel Southgate Shaler (1841-1906) 14
4. Second Kentucky Geological Survey (Part II) 17
5. John Robert Procter (1844-1903) 20
6. Prof. Charles Joseph Norwood 25
7. Joseph Bernard Hoeing 31
8. Dr. Willard Rouse Jillson 35
9. Index Geographic Map of Kentucky Showing Distribution of Detailed Mapping 185
10. Index Map of Kentucky Showing Progress of Topographic Survey to July 1, 1923 213

138093

Contents

Page
Illustrations v
Contents vii
Preface ix
Chapter I. Foundation 1
Chapter II. Third Reorganization of the Survey 23
Chapter III. Kentucky Geological Survey Publications 41
Chapter IV. Bibliography of Kentucky Geology 85
Chapter V. Publications of the United States Geological Survey Relating to Kentucky 149
Chapter VI. State and Miscellaneous Maps of Kentucky 157
Chapter VII. Maps of Kentucky by Counties 165
Chapter VIII. Status of Mapping in Kentucky Counties 177
Chapter IX. Available Maps and Reports of the Kentucky Geological Surveys 207
Index 213

Preface

For many years mineral operators and others interested in the geology, mineral resources, and soils of Kentucky have been in need of an adequate index to the literature and maps pertaining to these subjects. Since the first timorous pamphlets outlining some phases of the general geology of Kentucky were prepared and issued in the early part of the last century, the growing interest in our mineral resources has brought out much information relative to these things in every part of the State. The great body of this information of course lies within the covers of the reports of the several Geological Surveys of Kentucky, though much has been contributed from extraneous sources.

In answer to the demand for a systematic presentation of the work that has been done along geological lines in Kentucky, this volume has been written, the manuscript preparation having covered a period of five years. An honest attempt has been made to bring together by titles and in chronological order all of the publications and maps issued by the Kentucky Geological Survey and the U. S. Geological Survey. Other publications relative to Kentucky geology, mineral resources and soils, including some issued from private sources, have been included.

The present status of geological investigation and base mapping in Kentucky has been outlined by counties in two separate chapters. There is also included a general bibliography of 806 titles which it is thought is practically complete at the present time. A great many of the publications and maps, listed as published by the Kentucky Geological Survey and the U. S. Geological Survey, as well as those produced from other sources and included in the general bibliography are out of print and rare. The Kentucky Geological Survey, of course, cannot supply these, but in many cases such titles may be reviewed in the Frankfort, Lexington, Louisville, Cincinnati, and Washington public and institutional libraries. It may be of interest to the reader to know that unfortunately no public or private library contains a complete set of the Kentucky Geological Survey publications and maps, though the public libraries in the cities above cited have a working completeness of about ninety per cent.

For the preparation of the detailed index to this manuscript the writer is indebted to his friend Otto A. Rothert, of Louisville, Kentucky.

W. R. Jillson

Old State Capitol,
Frankfort, Kentucky,
October 1, 1923.

GEOLOGICAL RESEARCH IN KENTUCKY

CHAPTER I.

FOUNDATION.

Although a number of individual workers, trained in science according to their day, had been engaged in observing and to some extent reporting on various natural phenomena and geological features found in this state, it was not until February 16, 1838,[*] that official geological investigations of Kentucky were instituted. On that day Governor James Clark approved the Senate resolution of Mr. Cyrus Wingate authorizing the first geological and mineral reconnaissance of this state.

The idea of establishing an official Kentucky Geological Survey had been in the minds of a few forward-looking citizens of Kentucky for some little time, when on December 12, 1837,[**] Senator Cyrus Wingate, representing the 28th Senatorial District of Kentucky, Frankfort, Anderson and Owen counties, presented the memorial of the Carlisle County Agricultural Society, praying for the passage of a law for the establishment of a geological survey of the state. On the same day, December 12, 1837, Rep. James T. Morehead, of Franklin county, presented to the House of Representatives of Kentucky the petition or memorial of the Franklin Agricultural Society, praying the passage of a law authorizing a Geological Survey of the state.[†] This petition was referred to the Committee on Internal Improvement, as was the Senate memorial, and on Feb. 12, 1838, Senator Wingate again rising in the Senate read and laid on the table the following resolution, viz.:[‡]

"Whereas, it is important to the agricultural, manufacturing and commercial interests of the Commonwealth, that its mineral wealth and resources should be well understood, and be properly developed, therefore,

"Be it resolved by the General Assembly of the Commonwealth of Kentucky, that it shall be lawful for the Governor of the Commonwealth to appoint some competent person to prepare and report to the next General Assembly, a plan in detail for a geological and mineralogical survey of this state, together with the probable annual expenses, and the time necessary to complete said survey. It shall be the duty of the person thus appointed by the Governor to visit the mineral regions of this state, and make a geological reconnaissance thereof, and report to the next General Assembly his views thereon; and whether, in his opinion, the expenses attending such survey as is prepared will be compensated by the facts to be developed.

---

[*] Ky. House of Rep. Jour., 1837-38.

[**] Jour. Ky. Sen., 1837. Art. 4, p. 40.

[†] Jour. of Ky. House of Rep., 1837-38, pp. 66-67, Art. 7 and 9.

[‡] Jour. Ky. Sen., 1837, p. 383.

"And be it further resolved, that to enable the Governor to carry into effect this resolution the sum of one thousand dollars ($1,000.00) is hereby appropriated."

These resolutions met with the approval of Governor Clark, and opened the way for the first official investigation into the mineral resources of Kentucky.

In casting about to make a selection of the first State Geologist of Kentucky Governor Clark happily secured William Williams Mather, who was then one of a group of four able geologists of the state of New York. Prof. Mather was at this time (1836-44) engaged in geological work in the southeastern quarter or Hudson river region of New York state.

Mather's Life.

William Williams Mather,* one of the able early American geologists, was born May 24, 1804,** in Brooklyn, Conn., being a lineal descendant of the great divine, Richard Mather, who emigrated to this country in 1635, whose son, Increase, was President of Harvard College (1688-1701), and whose grandson was the celebrated witchcraft preacher "Cotton" Mather. Little is known concerning young Mather until he received his appointment as cadet at the United States Military Academy, West Point, New York, which was secured on the reputation of the good services of his Revolutionary War ancestors. Graduating in 1828, he was made Assistant Professor of Chemistry, Mineralogy and Geology from 1829-35. After service on the frontier in the northwest and southwest territories, he resigned from the army to take up the more agreeable scientific pursuits offered by private life. In 1836 he became Professor of Chemistry of the University of Louisiana, from which he retired in a few months to carry on geological investigations of the 1st district of the state of New York, which comprised those counties bordering upon the Hudson river.

---

*New International Encyclopaedia, 1920, Vol. XV., p. 240.

**Excerpted from Gen. Cullum's Biographical Register by Capt. L. E. Hibbs, U. S. Military Acad., West Point, N. Y., Corr. July 9, 1921.

While engaged in these researches (1836-47), he was State Geologist of Ohio (1837-40), and of Kentucky (1838). He was later Professor of Natural Science, Vice President and Acting President at the Ohio University at Athens (1842-50). He was State Agricultural Chemist for Ohio (1850-54). He was editor of the Western Agriculturist, and author of the "Geology of the First Geological District" in the Natural History of New York. He also published a text, quite widely used, entitled "Elements of Geology." Mather was given the degree of A. M. from Wesleyan University, Conn., in 1833, and LL. D. from Brown University, Rhode Island, in 1836. He was a member of various scientific and literary associations. His death occurred in Columbus, Ohio, at the early age of 54, during the most active and scientifically important period of his life.

The Mather Reconnaissance—1838.

The summer of 1838 was spent by Mather, then 34 years of age, in making a general geological and mineralogical reconnaissance of central, eastern and western Kentucky, which he produced in the form of a report of 40 (6x9″) pages, the last seven of which are devoted to a glossary of words used in the report, and intended as an aid to its clearer understanding. It was entitled a "Report on the Geological Reconnaissance of Kentucky, made in 1838."* It contained in its appendix, "A plan Suggested for Conducting the (proposed Kentucky Geological) Survey." In his report, page 3, Mather estimated the Eastern Kentucky Coal Field at 7,000 square miles, and the Western Coal Field, "most of which is in Green River Valley," he outlines as covering about twelve counties. After generally delimiting these two great coal fields, he took up in some detail the location of iron ore and its value in the state.

Speaking of the central and southern portions of Kentucky, Mather refers to them as "mostly occupied by limestone as a sub-strata and forms the richest and most productive agricultural regions of the state.'' He said:* ''Besides the limestone, the different strata of which are adapted for lime, hydraulic lime, building stones, or marbles, iron ore abounds in many places, and lead ore has been found in small quantities in numerous localities.'' He had a quick eye for natural transportation, and saw in Kentucky the possibility of using the rivers of this state during its early developmental period, for he remarks:** ''No state, probably, possesses such natural facilities for the transport of her mineral and agricultural products and her manufactures as Kentucky. The Big and Little Sandy flow in the midst of a region of coal, iron ore, copperas and alum rocks, sand rock, etc. The Licking, Kentucky and Cumberland penetrate beyond the agricultural into the very heart of the coal, iron and salt regions, affording every facility for an easy interchange of such products as are not sent from these districts to a more distant market. So with Green river, it flows from the heart of the state, through a rich agricultural and mineral country. And since this region contains an extensive coal formation far distant from any other in the valley of the Ohio (except that portion of it which extends into Indiana), it is reasonable to suppose that a large share of the coal which will be consumed in the valley of the lower Mississippi will be drawn from the coal basin of the western part of Kentucky and Indiana.† It is thought that the coal of the Green River Valley can be shipped to the lower markets at as low a price as that of St. Louis, the Illinois river, and the Mississippi above the Illinois, and probably cheaper, and will be able to compete with those mines, and perhaps a few have the preference in the market.''

---

*Jour. Ky. Sen., 1839, appendix, pp. 253-292.

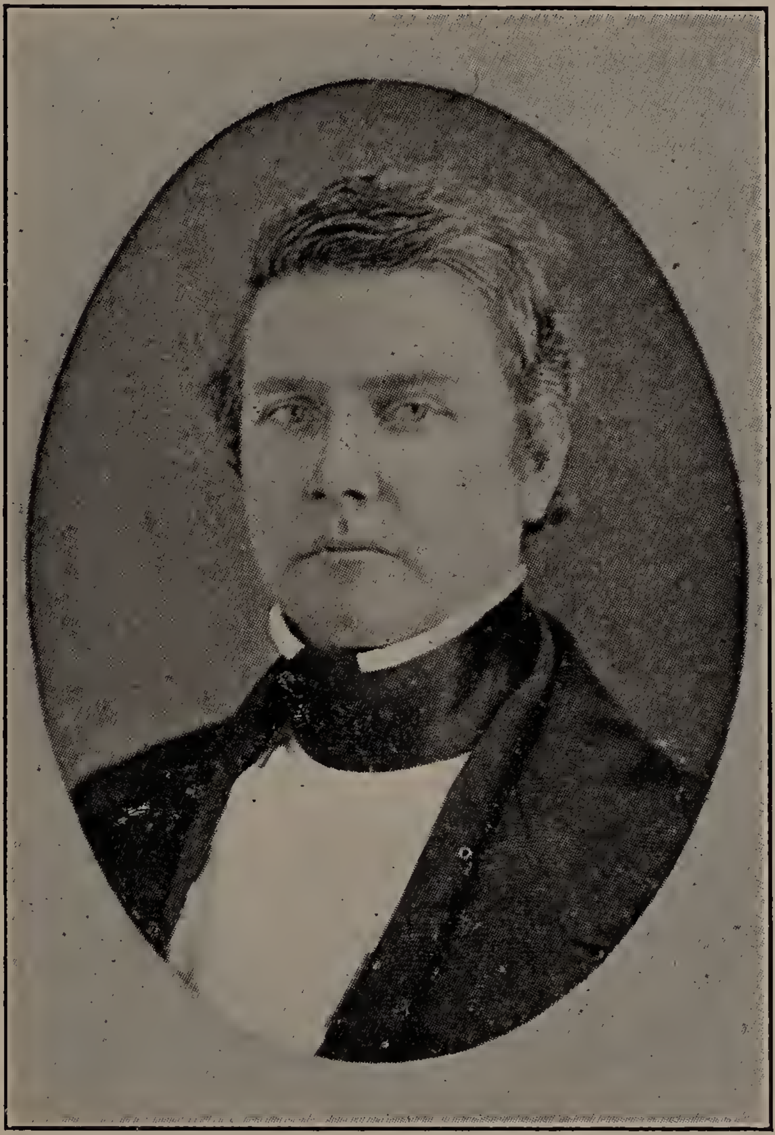
What a forecast! Almost a hundred years have slipped away since Mather wrote this memorable report, which has literally come true. What feelings must possess the man were it possible for him to come back now and stand again on Kentucky soil, and note the present development of the coal fields of Kentucky, which produced in 1922 an output of 38,982,044 tons, with an estimated value of $159,457,380.00. What pleasures must he acknowledge could he but see the Big Sandy, the Kentucky, the Green, the Cumberland and the Tennessee rivers locked through all their lower courses, with industrious little river packets steaming up and down their waters, and in this day of great railroad development, note that in southern and western Kentucky these rivers are still the only avenues for moving many of Kentucky's most valuable and indispensable agricultural and mineral resources.

---

*Page 242. First Geological Report on Ky., 1838, W. W. Mather.

**Pages 240-241. First Geological Report on Ky., 1838, W. W. Mather.

†Page 241. First Geological Report on Ky., 1838, W. W. Mather.



1. Dr. William Williams Mather (1804-1859).

Mather carefully noted the mineral production of Kentucky, for he says:* "The mineral districts are grouped in different parts of the state, and varied in their character and aspect as in their products. Coal, iron ores, salt, saltpetre, limestone for common and hydraulic lime, sandstones for building, and firestone, limestone for building stones and marbles, clay for bricks and coarse pottery, shale for firestone, fire bricks and pottery, and pyrites for the manufacture of copperas, are among the most important mineral substances of economical interest.

---

*P. 241, First Geol. Report on Ky., 1838, W. W. Mather.

"These substances occur in abundance within the limits of the state, but few of the locations, comparatively, are either known or appreciated by the mass of the people. In addition to these, are various valuable medicinal springs, petroleum or burning springs, and lead ore. Chalcedony, agate and amethyst, such as are extensively manufactured in Germany into small ornamental articles and precious stones, are common in some parts of the state. The mineral districts of Kentucky embrace in the aggregate almost the whole area of the state." Although he does not specifically name it. Professor Mather saw and recognized, as noted above, the amethystine fluorspar of this state. In his list he has named every important mineral resource now known or exploited. Apparently he found a very great lack of information on the part of the people of this state concerning the amount and value and variety of their mineral resources, a condition which it may be remarked has not been so very greatly altered through the passage of almost a century since he wrote (Dec. 28, 1838) his report, which was published[*] by legislative order as a state document in an edition of 150 copies[**] Jan. 3, 1839.

Although Mather pointed out the way for the establishment of a Kentucky Geological Survey of continuous function, nothing more was done about the matter, and no further geological survey was established for eight years, when on January 29, 1847, a memorial was presented to the state legislature by the Kentucky Historical Society by its committee, L. P. Yandell, Henry Pirtle and S. S. Goodwin, "In Relation to a Geological Survey for Kentucky." Although its memorial was backed by many authoritative letters from such men as Prof. Benjamin Silliman, of Yale College; Dr. C. T. Jackson, Boston; Dr. David Dale Owen and Dr. Joseph G. Norwood[†] of Indiana, nothing was accomplished.[‡]

ORGANIZATION OF THE FIRST GEOLOGICAL SURVEY OF KENTUCKY.

Either a lethargy of the times or perhaps a general preoccupation brought about by the conflict with Mexico served to sidetrack this important proposed legislation, and it was not until six years later, in 1853, when a "Memorial of the Agricultural Associations of the state and Many Citizens" to the General Assembly of Kentucky, in a pamphlet of 16 pages, including a geological sketch map of the state (largely improvised) was presented by Benjamin Gratz, George Robertson and Robert Peter, a committee of the Fayette County Agricultural and Mechanical Association; George W. Hancock, Phillip Speed and W. D. Gallagher, committee of the Southwestern Agricultural and Mechanical Association at Louisville; Robert Mallory, Daniel Brannin and William S. Helm, committee of the Union Agricultural and Mechanical Association of Shelby, Henry and Oldham counties, and Alex. M. Brown, William C. Lyle and G. W. Williams, committee of the Bourbon County Agricultural and Mechanical Association. The Memorial Committee urged the fitness of establishing a Geological Survey of Kentucky, holding "that the prosperity of any country bears a relation to the development and improvement of its natural resources by an enlightened population,"* and further that "no great public work promises to be more valuable to Kentucky, in proportion to the amount of expenditure required, than a thorough geological and mineralogical survey."** The "Peter" Memorial was properly organized, and resulted in the approval March 4, 1854, of the bill to provide for a geological and mineralogical survey of the state.

---

[*] Jour. Ky. Sen. 1839. Appendix, pp. 253-292.
[**] Jour. Ky. Sen. 1839, p. 87.
[†] Father of Prof. Chas. J. Norwood, V. State Geol. of Ky., 1904-1912.
[‡] Bulletin 109, U. S. Nat. Mus., pp. 102-104.

According to the letter of the law the Governor was required as soon as may be after the passage of the act, to appoint a State Geologist to undertake the organization in accordance with the bill of the Kentucky Geological Survey. Lazarus W. Powell, then Governor, appointed Dr. David Dale Owen, of New Harmony, Indiana, State Geologist of Kentucky in 1854; and the "Owen Survey," designated as first in literature, but actually the second, began to function vigirously. This survey was continually in operation until 1857, when, his assignment completed, Dr. Owen went to Arkansas to take up work as the State Geologist of that state. Following his departure and death, in 1860, Dr. Robert Peter (State Chemist), of Lexington, Kentucky, brought the manuscript and reports of the survey to completion, and took them through the press. An able assistant to Dr. David Dale Owen in the early survey of the geology of Kentucky, Dr. Robert Peter's services, especially in securing legislative action for the Owen Survey, were indispensible, and their value to the people of this state during this early period can never be accurately measured or overestimated.

---

* **Pages 104-105. Bulletin 109, United States National Museum G. P Merrill.

Life of Owen.

Dr. Owen was one of the most able early American geologists. He was the son of Robert Owen, the great social reformer, and though born in Scotland in 1807,* he came to the United States in 1823 and took a degree in medicine from the Ohio Medical College, now a part of Ohio State University. For some years following his graduation, Owen studied his profession and the sciences in Europe, returning in 1833 to this country, where through his relationship, and because of his father, and the recognition then given to the New Harmony social experiment, he was soon appointed State Geologist of Indiana. At the direction of the state legislature he made a geological survey of that state in 1839, and was employed by the United States Government to make a mineralogical survey of the lands of Iowa. In 1848 he made similar surveys in Minnesota and adjoining territories, the results of his work being published by order of Congress. His four years (1853-57) in Kentucky were followed by three (1857-60) in Arkansas. At the time of his appointment in Kentucky, Owen was 46 years old and at the apex of his scientific career. His death occurred at the age of 53 at his residence in New Harmony, Indiana, November 13, 1860.

The Owen Survey.

(Series I, 1854-57)

In the literature the (Owen) Kentucky Geological Survey, known as Series 1, consists of four volumes (7x10″) totaling 2,012 pages, distributed as follows:

---

*New International Encyclopaedia, 1920, Vol. XVII., p. 649. Nat. Cyc. Am. Biog., Vol. VIII., p. 113.

Vol. I	415 pages
Vol. II	391 pages
Vol. III	589 pages
Vol. IV	617 pages

The personnel of the Owen Survey was as follows:

David Dale Owen, M. D.	State Geologist
Robert Peter, M. D.	Chemist
Sidney S. Lyon	Topographer
Leo Lequereaux	Paleobotanist
Joseph P. Lesley, Jr.	Topographer

2. Dr. David Dale Owen (1807-1860).

No detailed geographical or geological mapping in Kentucky had proceeded the Owen Survey, and its record is therefore largely that of a pioneering organization. The reports carefully, scientifically and accurately made to that day, are devoted to the chemical examination and composition of the various minerals and soils of the state, stratigraphical determinations of the major sedimentary sequences, the first topographic maps of portions of the state, delimitations of a portion of the eastern and western coal fields, etc. With the progress of the later works of the Owen Survey, the dark, ominous clouds of civil strife, began to gather. In 1860, following the death of its State Geologist, Kentucky finally turned its attention away from further geological investigations, and centered them on the burning issues of the day. The first Kentucky Geological Survey (Series 1) was at an end. During those four terrible years which followed, when contending northern and southern armies alternately moved through the capital city of our state, collections and manuscripts of great geological value fell repeatedly into ruthless hands. Much which would have been of inestimable value during the peaceful years which were to come in these and later years felt the torch,* and was thus lost forever.

Reorganization and Selection of Professor Shaler.

During the reconstruction period following the close of the Civil War, public attention in Kentucky was again directed toward the many valuable works accomplished by former State Geological Surveys. In March, 1872, a bill was introduced in the General Assembly looking towards a reorganization of the Kentucky Geological Survey, but it was defeated in the House of Representatives by a vote of 32 ''nays'' and 43 ''yeas,'' three less than the constitutional majority required to pass it. The subject was a rising one, however, and came up in the legislature again in the spring of 1873, at which time it was given more consideration, and attained a successful passage. On March 22, 1873, the Governor approved the act to provide for the new Geological and Mineralogical Survey of the state.

The new bill called for appointment by the Governor, immediately upon its passage and approval, of a State Geologist; and gave instructions as to the organization of a new, or what came to be known later as the second Kentucky Geological Survey (Series II). Under this act of 1873, Governor Preston H. Leslie appointed Prof. Nathaniel Southgate Shaler, a native of Newport, Ky., and at that time Professor of Paleontology in the Lawrence Scientific School of Harvard University, Cambridge, Mass., Director and State Geologist.

---

*Rep. of Progress 1886-87, K. G. S., p. 4.

Life of Shaler.

Prof. N. S. Shaler, who was born in 1841, entered upon his new duties as State Geologist of Kentucky, August 22, 1873, at 32 years of age. He was even at this time, however, well known, and was destined to be before his death in 1906, at Cambridge, Mass., one of the best known and authoritative American geologists and scientific writers. As an author of several works of a general and a literary style he was also well known and widely read. He was graduated from Lawrance Scientific School of Harvard University in 1862 with a degree of A. B., *summa cum lauda*. Following his graduation he came to Kentucky and volunteered in the Union Army, where he served for two years, rising to the rank of captain in charge of a volunteer battery.* His health, never of the best, was undermined by the contraction of malaria in camp, which was followed by a severe attack of bronchitis. After Morgan's raid into Ohio in the summer of 1863 his condiion became serious, and upon medical advice he gave up his command.

In 1864 he was appointed Assistant in Paleontology in the Museum of Comparative Zoology** in the Lawrence Scientific School at Harvard, and the following year he took charge of the regular instruction in Zoology and Geology. Shaler spent the years 1866-68 in Europe, and on his return to the United States was appointed Professor of Paleontology at Harvard, serving until 1888, when he became Professor of Geology. His period of service as Director and State Geologist of the Kentucky Geological Survey was from 1873-1880. In 1884 he became Geologist of the Atlantic Coast Division of the United States Geological Survey, and in 1891 he was made Dean of the Lawrence Scientific School of Harvard University.†

In 1895 Dr. Shaler was elected President of the Geological Society of America. Prof. Shaler received two doctorates, S. D. in 1875, and LL. D. in 1903, from Harvard University.‡ The following better known books have been selected from a long list of publications: "Thoughts on the Nature of Intellectual Property and Its Importance to the State” (1878); “Illustrations of the Earth’s Surface: Glaciers” (1881), with W. M. Davis; “First Book in Geology” (1884); “Kentucky” (1885); “The United States of America” (1894); “The Interpretation of Nature” (1895); “Domesticated Animals” (1895); “Nature and Man in America” (1895); “American Highways” (1896); “Outlines of the Earth’s History” (1898)”; “The Individual: A Study of Life and Death” (1900); “The Citizen” (1904); “The Neighbor” (1904); “Man and the Earth” (1905); “Autobiography of Nathaniel Southgate Shaler” (New York, 1909).

---

*Autobiography of N. S. Shaler, Haughton-Mifflin Co., Chapter 16.

**Ibid., page. 225.

†New International Encyclopedia, 1920: Vol. XX., p. 785.

‡Quinquennial Catalogue, Harvard University, also private corresp. Geo. W. Robinson, Harvard Grad. Sch., Cambridge, Mass., July 11, 1921.

Shaler Survey (1873-1880).

(Series II, Part I.)

In organizing the second or new Kentucky Geological Survey (Series II), under the act of 1873, Professor Shaler, with the approval of Governor Leslie, made the following initial appointments:

Dr. Robert Peter	State Chemist
Dr. A. R. Crandall	Geological Assistant
Mr. J. H. Talbutt	Chemical Assistant
P. N. Moore	Geological Aid
J A. Monroe	Assistant
C. W. Beckham	Assistant
C. Shenk	Assistant

Under Prof. Shaler’s direction, a general reconnaissance of Kentucky was undertaken to outline the problems which would have to be solved. A topographic map of the state one inch to the mile was started; a geological map showing areal distribution of the various formations was undertaken. To this was added the study of living animals and plants of this state in order to show their usefulness to society. Further physical studies along lines of climatology and magnetic variations were undertaken. Cooperation was sought with many widely distributed volunteer corps of laymen, and there was subsequently added to the personnel of the survey: C. J. Norwood, H. Herzer, W. M. Linney, as Geological Assistants; W. B. Caldwell as Mineralogical Assistant; W. B. Page, W. C. Mitchell, E. Underwood, and J. B. Hoeing, as Topographical Assistants; A. C.

Packard as Ornithological Assistant; F. Sanborn as Zoologist Assistant; F. W. Putnam as Ichthylogical Assistant; J. B. Bussey as Botanical Assistant; Lucien Carr as Enthological Assistant; and L. Trouvelot as Artist; and A. L. Jones and John Robert Procter as General Assistants.

The geological literature pertaining to Kentucky, published under the direction of Dr. Shaler, consists of six volumes (7x10″) totaling 2,886 pages, which are distributed as follows:

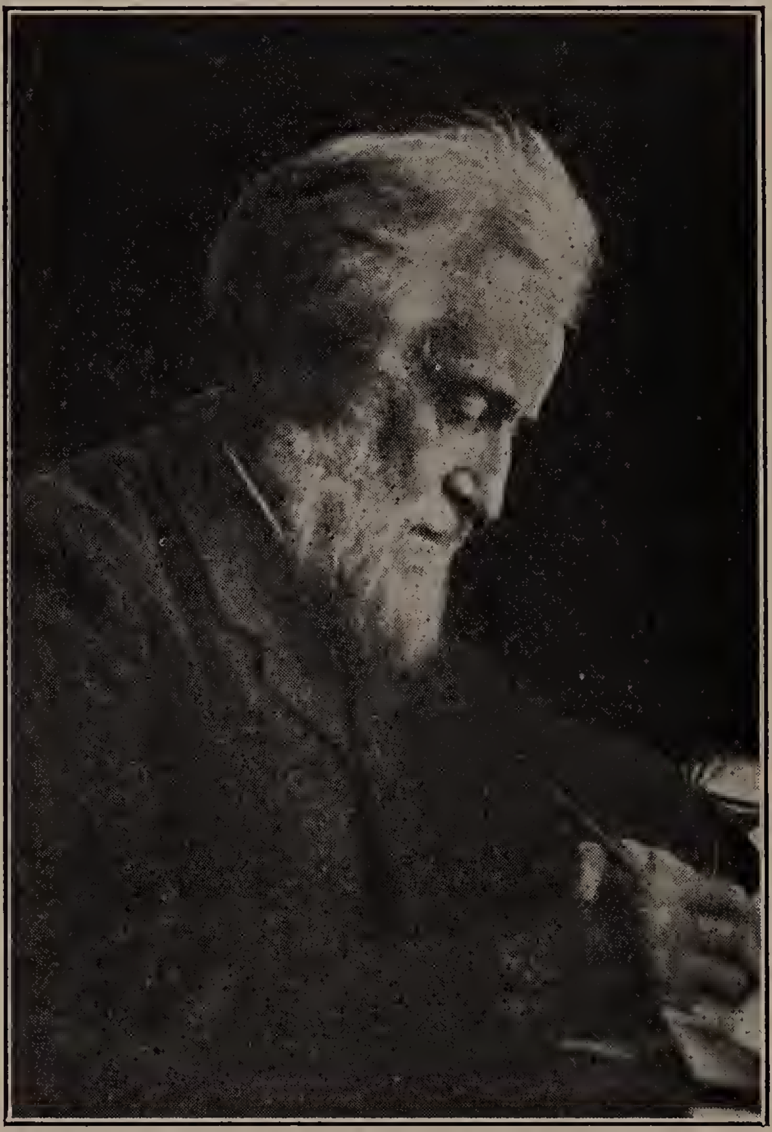
Vol. 1	504 pages
Vol. 2	476 pages
Vol. 3	451 pages
Vol. 4	461 pages
Vol. 5	507 pages
Vol. 6	487 pages

Unfortunately Vol. 6. which was arranged by Professor Shaler, and in part stereotyped under his name, was in part preempted without his authority during his directorship by John Robert Procter, his assistant in charge. This volume consists of 487 pages besides several maps, and is here credited to the Shaler Survey, where it rightfully belongs. Besides the above named publications, Prof. Shaler published a set of memoirs of the Kentucky Geological Survey, size 8x11″ in which various authors took up special topics as follows: ''Antiquity of Caverns and Cave Life in the Ohio Valley'' (13 pages); ''American Bison'' (246 pages, 12 plates); ''Fossil Brachiopods of the Ohio Valley'' (45 pages, 8 plates); ''Prehistoric Remains of Kentucky'' (31 pages, 7 plates); ''General Account of the Life of Kentucky'' (104 pages, 1 map); ''Culture of Flax and hemp'' (107 pages).

Under the administration of Professor Shaler, Kentucky may be said to have enjoyed its first systematic and diversified geological survey, since much of the work done under Mather and Owen, his predecessors, was of a preliminary and pioneering character. Professor Shaler brought to the survey an organizing genius, as well as a thoroughly trained and efficient geological and scientific understanding and appreciation. A glance at the titles of the reports prepared under his direction and at his suggestion show the breadth of the scientific division of the man. Professor Shaler was a geological worker himself.

His own separate researches and investigations in Kentucky make up a larger portion of the reports prepared under his administration than did the individual works of both Mather and Owen combined.

It was unfortunate for Kentucky that Professor Shaler, always subject to malaria south of the Ohio river, found it impossible to live continuously in this state. It was doubly unfortunate that due to his enforced absence from Frankfort through relatively long periods of time, that his office assistant, John Robert Procter, should have taken advantage of the situation offered, to provide and successfully carry through the legislature a resolution requiring the State Geologist to reside at all times in Frankfort. This resolution compelled the resignation of Professor Shaler in April, 1880, who never, until his later



3. Dr. Nathaniel Southgate Shaler (1841-1906).

years, knew that his assistant, Procter, had backed the movement. He had always trusted Procter.*

The state of Kentucky, through this bit of political maneuvering, gave up voluntarily the leading position which it then occupied among the states in geological investigations. Years passed while Kentucky stumbled along in a lethargy of political preferment, allowing its untold mineral wealth to lie relatively dormant, largely unnoted and undeveloped. In the meantime its sister states, keenly awake to the value of, in many cases, inferior mineral resources, pushed ahead with all vigor their respective Geological Surveys and other scientific investigations.

ACT OF 1880 AND SELECTION OF PROCTER.

Though his desire to secure the directorship of the Kentucky Geological Survey, Procter, in successfully urging the passage of the act of April 26, 1880, in the Kentucky General Assembly, laid up for himself unknowingly many new and exasperating official duties. He later came to know, as his official reports repeatedly show, how ''uneasy lies the head that wears a crown.'' The unfortunate act relative to the Kentucky Geological Survey, which was approved by Governor Luke P. Blackburn, provided, in section 4, as follows:†

''That the Governor shall, at this and each regular meeting of the legislature, appoint a State Geologist, by and with the advice and consent of the Senate, for the term of two years, or until his successor is appointed and qualified, who shall reside at Frankfort, and be there at all times when not engaged in the necessary surveys, and who shall be a commissioner of immigration. Said commissioner shall attend to the office work of the survey, and, in addition thereto, he shall collect, compile, publish and circulate, in such manner and by such agencies, and in such places as he may deem proper and advisable, in the United States and in foreign countries, pamphlets and other publications descriptive of the resources and advantages of this state, and such other facts and information having a tendency to attract and promote immigration, and otherwise use his discretion in the furtherance of immigration, and the bringing of skilled labor and capital into the state. He shall also collect and disseminate such information as in his judgment will best aid in the founding of industries to utilize and manufacture within the state raw products of the state.'' . . .*

---

*Bull. No. 109, U. S. Nat'l Mus., G. P. Merrill, p. 115.

†Pvt. corresp. Arthur M. Miller, Lexington, Ky., July 5, 1921.

Immediately following the resignation of Dr. Shaler, Governor Blackburn appointed Shaler's office assistant, John Robert Procter, then 36 years old, Director of the Kentucky Geological Survey and Bureau of Immigration, saying, ''for once, the right man will be in the right place.''** The remark was indeed a sad commentary on the light of the times, for John Robert Procter, though at this time an able man as an administrative officer and politician, and later destined to become the father of the great United States Civil Service reform movement in this country, was wholly unfit, through lack of technical and practical geological and engineering training, experience and ability, to be the Director and State Geologist of Kentucky.

PROCTER'S LIFE.

Mr. Procter was born at Cedar Hill, Mason county, Kentucky, March 16, 1844.† He was the son of George Morton Procter and Annie Marie Young; unfortunately his mother died at his birth, and when his father re-married, young Procter was taken by his aunt, Emily Shackelford, and under the guardianship of his uncle, Seth Shackelford, was raised and educated by private tutors at his home, ''Cedar Hill.'' In 1863 he entered the University of Pennsylvania as a special student, and left at the close of his freshman year.‡ Speaking of this period of her husband's life, Mrs. John R. Procter says:*** ''He had wanted to go into the Confederate army, but promised his Aunt Emily Shackelford that he would not go while she lived. . . . He came home to Kentucky and left at once for the south, therefore did not graduate, which was a mistake—but so many were mistaken at that time. His Aunt Emily was the only mother he ever knew.'' . . .

In the Confederate army Procter became lieutenant of artillery, and served from October, 1864, to April, 1865. Mr. Procter's life during the period immediately following the Civil War, was devoted to farming in Kentucky. In 1874 he went into the Harvard University camp in Kentucky as assistant with Dr. Shaler. The following year he took a special course at Harvard, and later became Assistant on the Kentucky Geological Survey at Frankfort. In 1880 he succeeded Dr. Shaler as State Geologist of Kentucky. He served as Director of the Kentucky Geological Survey and Commissioner of Immigration from 1880 to May 26, 1892.

---

*Ky. Acts of Gen. Assembly, 1880.

**Record Univ. of Pa. Corresp., R. B. Burke, Assistant to Dean A. H. Quinn, July 11, 1921.

†National Cyclopaedia of Am. Biog., Vol. 13, p. 216.

‡Private Corresp. of Mrs. Julia Leslie Procter to the author.

***Private Correspondence to the Author, July 14, 1921.

4. Second Kentucky Geological Survey (Part II.)
The view is in the old survey office. J. R. Procter, director, is in the background and E. A. Fellmer, secretary, in the foreground.

During the early nineties friction and general bad feeling developed between the Governor's office and the Kentucky Geological Survey. Numerous investigations were ordered, and resulted in condemnatory reports by the State Inspector. Procter, who had studiously evolved and applied the rudiments of civil service idea on the survey, refused to dismiss men whom he considered able and technically trained, in order to accommodate the whimsicalities of Governor John Young Brown. Governor Brown had asked that a vacancy be made on the Kentucky Geological Survey to accommodate his son. Procter, in refusing to do it, signed his own death warrant and that of the second Kentucky Geological Survey. But he drew unto himself by so doing nation-wide attention, and in December, 1893, President Cleveland appointed him to the U. S. Civil Service Commission.

He removed to Washington, where his genius for organization and administration found ample expression in more than ten years' service as a civil service executive. The fundamental rules of civil service which he had promulgated through the Kentucky Geological Survey were expanded, and made to apply to many different federal departments; and have beyond doubt been contributory to great efficiency among federal employees. On the 10th anniversary of his service, Dec. 2, 1903, Mr. Procter was presented with a loving cup at a White House luncheon, by President Roosevelt and others, who had served under him on the Civil Service Commission. It was the end of the successful career of the able civil service reformer, for shortly thereafter he was stricken with heart trouble, and ten days later, on the 12th of December, 1903, he died.*

John Robert Procter was an able thinker, and became an author of considerable reputation during his federal service, his articles appearing in the Forum, and other magazines. He had a brilliant, rather versatile mind, and a very interesting, somewhat magnetic personality. His scientific contributions to the literature of the Kentucky Geological Survey are small, however, and are confined to the six administrative reports of progress from 1880 to 1892; a brief report on the Resources of the North Cumberland Valley in 1880; and "The Culture of Flax and Hemp." To these must be added the strictly immigration reports which were in effect a series of non-scientific, advertising pamphlets, partly illustrated, totaling 674 pages. These latter reports, however, though containing much information data concerning Kentucky, were largely composed of letters by other individuals, and consisted in part of a monstrous duplication of tabular matter excerpted from the reports of the Shaler Survey. A great many of these immigration reports were published in German.

---

*Private corresp. of Mrs. J. R. Procter to author.

PROCTER SURVEY (1880-1892).

(Series II, Part II.)

The personnel of the Procter Survey consisted of:

John Robert Procter	Director
Dr. Robert Peter	State Chemist
Dr. A. R. Crandall	Assistant Geologists
William M. Linney	
Dr. R. H. Loughridge	
George M. Sullivan	
Edward Orton	
James M. Hodge	
Joseph B. Hoeing	Carlographer and Engineer
Charles J. Norwood	Geological Assistant
G. R. C. Ballard Thruston	Geological Assistant
Charles Wickliffe Beckham	Ornithologist
E. A. Fellmer	Secretary

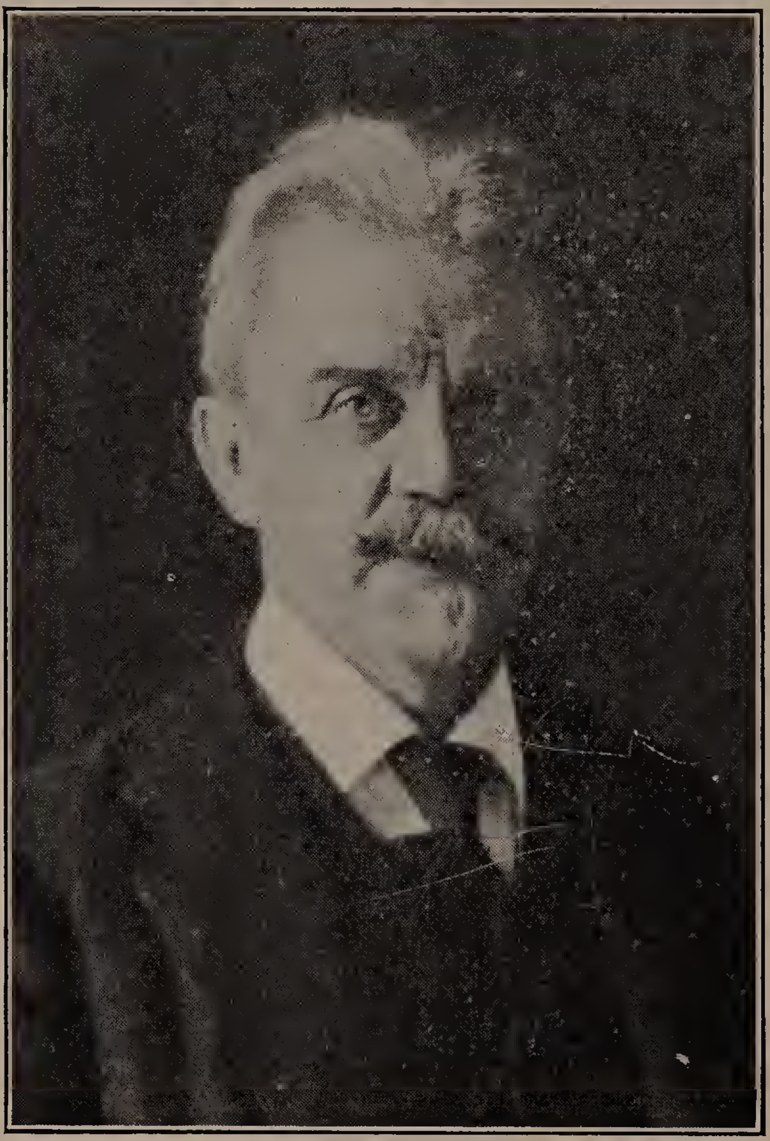
The geological reports published by the Procter Survey consist of grouped reprints of the reports of the Shaler Survey, and several new regional and county reports, most of which were published in (7x10″) volumes designated as "A," "B," "C," etc. These volumes totaled 3020 pages, of which 1336 pages were reprinted, leaving 1684 pages as the new or constructive work of the Procter Survey. These reports were distributed as follows:

Vol. A, Part I, Chemical (Rep't.)	477 pp.
Vol. A, Part II, Chem. (Part Rep't.)*	348 pp.
Vol. A, Part III, Chemical (new)	240 pp.
Vol. B, Botanical (Rep't.)	239 pp.
Vol. C, Part I, Eastern Coal (Rep't.)	305 pp.
Vol. C, Part II, Eastern Coal (new)	278 pp.
Vol. D, Western Coal (Rep't.)	222 pp.
Vol. E, Oil and Gas (new)	233 pp.
Vol. F, Jackson Purchase (new)	357 pp.
	2699 pp.
County Reports (incomplete list)	321 pp.
Total pages of reports, Procter Survey	3020 pp.

The county reports, known as the "County Surveys," were generally published separately as paper pamphlets, and many of them have for this reason been lost, and are now very rare. Geological maps, which for the most part were sketched in the field, were redrawn in the office and were printed in lithographic colors with the reports. This work was done by W. T. Knott, W. M. Linney, Geo. M. Sullivan, J. C. Fales, A. R. Candall, and R. H. Loughridge. These county reports, though not now to be found in complete assortment in any library, are known to contain a total of at least 321 pages, possibly 400 pages, or perhaps more. This reconnaissance geology, largely done in the Bluegrass counties of central Kentucky, had a value in familiarizing the public with many facts of geological, historical and agricultural interest. Though the geology, as then done, is now greatly out of date, and will eventually have to all be reworked, it was not without considerable value at the time.

---

*Vol. A, Part II, 33 pp. reprinted, 255 new.



5. John Robert Procter (1844-1903).

In the lapse of nearly thirty years since the close of the

Procter Survey, many have come to criticise its accomplishments. It is pointed out by most of these critics that relatively little, about 1684 printed pages, representing new and valuable geological investigation in Kentucky, was published. On the other hand, however, much time, attention and money were spent in republishing re-assembled reports, which even at the time must have been growing obsolete. And there is added to this accusation the fact that the Procter Survey in the twelve years of its duration enjoyed a longer continuous function than any other Kentucky Geological Survey either before or since. As a refutation, it is regarded only just to state that Procter was always burdened with his immigration work, which though well suited to his administrative ability, did not receive any substantial appropriation from the legislature for its continuance. He was therefore forced to invade funds which were primarily geological; and as a result had to abandon many geological investigations which he might otherwise have undertaken.

Robert Peter, who served through the Owen, Shaler and Procter Surveys, and was conversant with their aims and activities from their inception to the last, says with respect to the combination in 1880 under Procter of the second Kentucky Geological Survey and the Bureau of Immigration:* "It would appear, therefore, that the amalgamation was decidedly to the detriment of the work for which the Survey was originally created. . . . It appears further that on April 30th, this year (1892) the State Inspector and Examiner made a report to the Governor unfavorable to Procter's management of the finances of the survey. This was replied to by the geologist in a letter subsequently privately printed, . . . but it was apparently without effect so far as the life of the organization was concerned. . . . This was succeeded by (several) resolutions and enactments, the intent of which is obvious, and the (Procter) Survey came to a somewhat inglorious end in 1893."*

This, the first attempt to combine with the Kentucky Geological Survey another unrelated state office, the Immigration Bureau, had proved a failure to both departments, and resulted in their abolishment. Twenty-six years later, another and a new generation of law makers at Frankfort were destined to repeat this experiment by trying to consolidate the Board of Forestry with the Kentucky Geological Survey. Needless to say, the politics which were served in the latter case, like those of its predecessor, brought upon the second experiment results that were almost as disastrous to the best interests of the Commonwealth as those which closed the Procter Survey.

---

*Bull. No. 109, U. S. Nat. Mus., G. P. Merrill, pp. 122-123.

CHAPTER II.

THIRD REORGANIZATION OF THE SURVEY.

The impetus given to the development of Kentucky's mineral resources, especially coal, by the proposed extension of several of the mountain railroads of this state, had in the late nineties, reduced to an unsatisfactory minimum the available reports of the second (Procter and Shaler) Survey. Early in 1900 there began to crystalize a widespread demand for a reorganization of the Kentucky Geological Survey, the old properties and effects of which were in the custody of Prof. Charles J. Norwood as Curator at Lexington. At the meeting of the General Assembly in 1904, Senator Nat A. Porter, recognizing the demand, introduced on Jan. 6, Senate Bill 16, "An act providing for and authorizing the curator of the Kentucky Geological Department to resume the geological, topographical and agricultural survey of the state of Kentucky, and providing for topographical surveys in cooperation with the U. S. Geological Survey."* This bill was reported favorably by Senator Fleming, Chairman of the Committee on the Geological Survey, on January 20th,** and was passed unanimously in the Senate January 25th,*** and in the House on February 10th.**** Governor J. C. W. Beckham signed it November 5th,***** and by virtue of the new act Prof. Charles J. Norwood, without direct appointment or additional salary, became the Director and active head of the new third Kentucky Geological Survey.

Norwood's Life.

Charles Joseph Norwood was born at New Harmony, Indiana, Sept. 17, 1853,†. the son of Dr. Joseph Granville and Mary Frances Pugh Norwood. His early education was secured from private tutors, and later, during the years 1868-1872, he attended the University of Missouri, from which, however, he did not graduate.‡ The Kentucky Agricultural & Mechanical Col-

---

*Jour. of Sen., 1904. p. 45.
**Jour. of Sen., 1904, p. 161.
***Jour. of Sen., 1904, p. 205.
****Jour. of Sen., 1904, p. 412.
*****Jour. of Sen., 1904, p. 947.
†Who's Who in America. Vol. 11. 1920-21, page 2118.
‡Corresp. Registrar Univ. of Mo. with author.

lege conferred upon him, in 1906, the honorary degree of M. S. During the year 1871-72 he was assistant in Physics at the University of Missouri. From 1872-74 he was an Assistant Geologist on the Missouri Geological Survey. Coming to Kentucky in 1874, he was appointed Assistant on the Kentucky Geological Survey by Prof. Shaler, where he served until 1880.

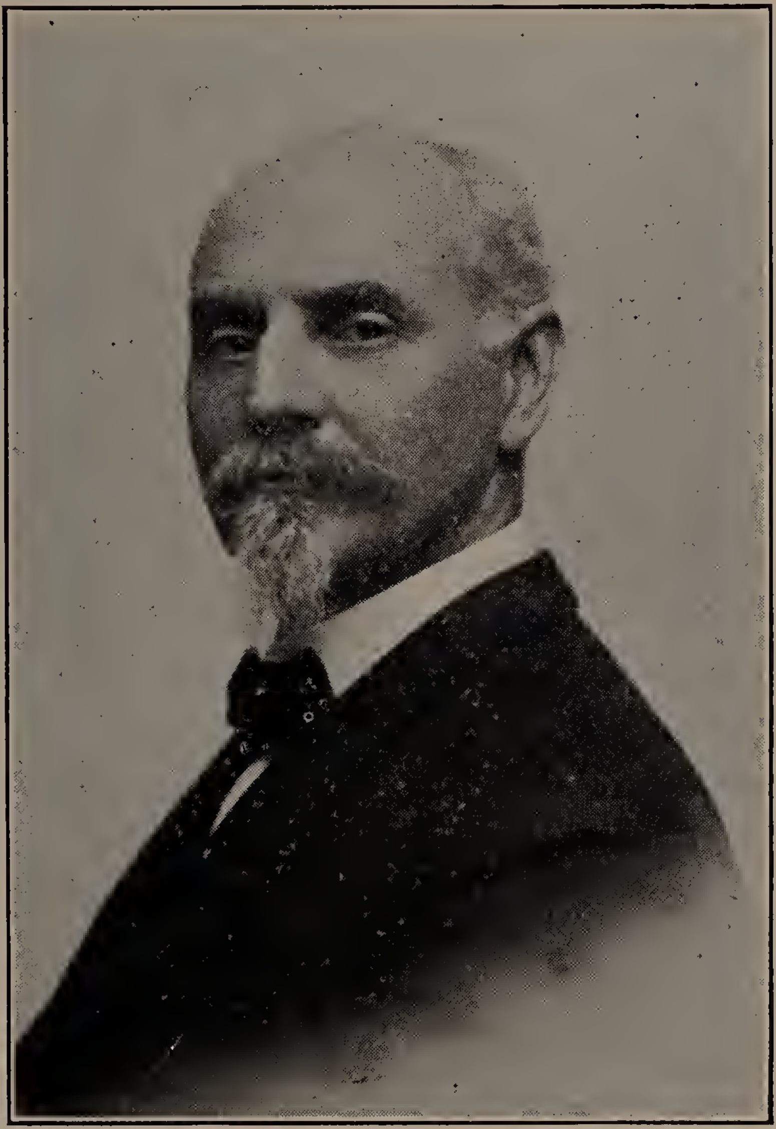
During a portion of this time (1872-1881) he taught Natural science at Bethel College in Russellville, Kentucky. About the same time, 1879-1882, he was engaged as editorial writer on the Russellville (Ky.) Herald-Enterprise. During this period and later he was also engaged as mining engineer for several gold, silver and coal producing companies. From 1884-1897 he was Inspector of Mines for Kentucky, and was the Curator of the effects of the former Kentucky Geological Survey from 1893-1904.

With the reorganization of the Department of Mines in Kentucky in 1902 in connection with the State College (afterward the University of Kentucky), Prof. Norwood was appointed to the position of State Inspector of Mines, and Dean of the Colledge of Mining Engineering. In 1904, at the age of 51, with the re-organization of the Kentucky Geological Survey, Prof. Norwood became Director by statutory enactment, which position he held until 1912. In 1918 he resigned the Deanship of the College of Mining and Metallurgy of the University of Kentucky, remaining, however, as State Inspector of Mines until 1920. Since this time he has been head Professor of Mining in the College of Engineering of the University of Kentucky. Prof. Norwood was also Curator of the Kentucky mineral exhibits at the St. Louis Exposition in 1904, and the Jamestown Exposition in 1907. He resides at 339 Aylesford Place, Lexington, Ky. Prof. Norwood is the author of a large number of administrative and executive reports, chiefly dealing with the activities of the State Department of Mines (which are not listed here), and the progress of the Kentucky Geological Survey.

NORWOOD SURVEY (1904-1912).

(Series III)

Under the law of 1904 reorganizing the third Kentucky Geological Survey (Series III), provision was made for the study of the geology and resources of this state by special subjects, rather than by regions. Section 5 of this statute outlined the work of the new director as follows:* "It shall be the duty of the Director and his assistants to examine and report upon the Economic Geology of the state especially, giving particular attention to mineral resources, as coal, iron, lead, zinc, barite, fluorite, clays, stone, building stones, asphalt rock, road and paving material, salt, cement material, natural fertilizer, petroleum, natural gas, abrasives, marble, lithographic stones, and other minerals; determining their location and extent, which shall be shown on appropriate diagrams and maps. . . . . The occurance of mineral springs shall be noted, and the waters analyzed when necessary, and the water powers of the state



6. Prof. Charles Joseph Norwood.

---

*Report of Progress of the Survey for the years 1904-1905, by Chas. J. Norwood.

shall be investigated. The soils of the state shall also be studied. The character and distribution of the timbers of the state shall also be determined.''

In following out the letter of the newly enacted statutes, the following personnel of both regular and temporary employees of the third Geological Survey was established: Director, Charles Joseph Norwood; Assistant Geologists, Joseph B. Hoeing, Arthur M. Miller, F. M. Hutchinson, James M. Hodge, William C. Morse, L. C. Glenn, August F. Foerste, W. F. Pate, Albert R. Crandall, James H. Gardner, Samuel A. Denny, F. Julius Fohs, William M. Nichols and Harry D. Eastman; Chemists, A. M. Peter and James H. McHargue; Mining Assistant, James E. Wright; Geological Assistant, Moritz Fischer; Mining Aide, Robert H. Barclay; Aide, George V. Triplett, Jr.; Secretary, Curtis L. Jones; Assistant Secretary, W. U. Grider; Topographic Assistants, Joseph G. Lewis and Joseph S. Shaw; Draftsman, R. E. Mooreman; Aides, Oscar R. Kroell, Hargis Hill, Boyd M. Sims, Kay K. Kevil and William W. Shelby, Jr.; Geologic Aides, Charles R. Gilmore, W. C. Payne and John Goff.

The publications of the third Kentucky Geological Survey under the Directorship of Prof. Norwood consist of 21 separate bulletins, 2 county reports, and 4 reports of progress of the Survey, all of which deal with the natural and mineral resources of the Commonwealth, and total 2,761 pages. These reports are distributed as follows:

(All titles abbreviated, full titles on pages 65-69.)

(1905)	Pages
Bulletin No. 1, "Oil and Gas Sands"	233
Bulletin No. 3, "Lead and Zinc"	35
Bulletin No. 3, "Chemical Report"	77
Bulletin No. 4, "Big Sandy Coals"	136
Bulletin No. 5, "Upper Ordovician Rocks"	64
Bulletin No. 6, "Kentucky Clays"	223
(1906)	
Bulletin No. 7, "Silurian, Devonian, etc."	369
Bulletin No. 8, "Thin Coal Seams" (never published).	
(1907)	
Bulletin No. 9, "Fluorspar Deposits"	239

(1910)

Bulletin No. 10, "Licking Valley Coals"	90
Bulletin No. 11, "Coals of Three Forks Ky. River"	280
Bulletin No. 12, "Western Border Eastern Coal Field"	83

(1912)

Bulletin No. 13, "Cumberland Coal Field"	223
Bulletin No. 14, "Pineville Gap Coal Field"	130
Bulletin No. 15, "Geology of Fluorspar" (never published).	
Bulletin No. 16, Waverlain Formations"	76
Bulletin No. 17, "Tradewater River Coals"	75
Bulletin No. 18, "Quicksand Creek Coals"	79
Bulletin No. 19, "Coals of Central City, Ky."	127
Bulletin No. 20, "Eco. Geol. Hartford Quad."	33
Bulletin No. 21, "Dix River Water Power"	63
Co. Rept. No. 3, "Eco. Geol. of Lewis and Rowan Counties"	62
Co. Rept. No. 4, "Resources of Rockcastle County"	112
Report of Progress, (1904-05) (Miscl. Abstracts)	56
Report of Progress (1906-07) (Miscl. Abstracts)	88
Report of Progress (1908-09) Miscl. Abstracts)	127
Report of Progress (1910-11) (Miscl. Abstracts)	38

Longer in duration than the Mather, Owen or Shaler Surveys, yet shorter by four years than the Procter Survey, which was its predecessor, the Kentucky Geological Survey, under the direction of Prof. Charles J. Norwood, found in the eight years of its function, ample time for the expression of its aims and organization. To the many earnest students of the geological literature of this Commonwealth, the economic and other special reports of the Norwood survey came as a very pleasant change from the regional reports, county and otherwise, prepared by the preceding surveys. Credit is due Prof. Norwood for his pioneering work in this respect, and while it is apparent from a review of the reports of progress that a large number of manuscripts which were outlined and prepared, and paid for by the state at his order, were never published under his directorship, those which were presented to the public amply justified the reorganization in 1904, and the change to special economic reports from those of a more regional nature.

FOURTH REORGANIZATION GEOLOGICAL SURVEY.

With the change from the Wilson (Rep.) administration to the McCreary (Dem.) administration, in 1911, there came from several sections of the state, but more particularly from eastern Kentucky, a demand for a reorganization of the Kentucky Geological Survey. This demand was based upon an alleged condition of inactivity on the part of the Norwood Survey, and was backed by two very influential and wealthy men of the Big Sandy Valley. These men were John C. C. Mayo, of Paintsville, coal operator, and Rufus H. VanSant, of Ashland, timber owner. Governor James B. McCreary, who had watched (1875-79) the progress of the Shaler Survey, was easily won over to the proposed change. This was made by the state legislature of 1912, which created the new (4th) Kentucky Geological Survey, and provided for the removal of its office and effects, with the exception of the state museum, from Lexington, Ky., to Frankfort, Ky.[*] The movement was carried out through House Bill 76, which was unanimously passed in the Senate March 2d.[**] and was signed by Governor McCreary March 7th.[***]

Under this act, which took effect July 1, 1912, the office of the Director of the Survey and Curator of the Geological Department was abolished, and as head of the official geological survey of the state, the Governor, in Article 2, was called upon, "With the advice and consent of the Senate (to) appoint a competent person as State Geologist, who has a thorough scientific and practical knowledge of the science of geology, mineralogy, hydrology, chemistry and the allied subjects. He shall not be connected with any college, and shall devote his entire time to the surveys." Article III of these "Acts" provided for "an advisory board consisting of five members, one of whom shall be the Governor, who shall be President of the Board, and the other four members shall be appointed by the Governor." The period of office for both the State Geologist and the members of the Board was placed at four years. It is interesting to note that John C. C. Mayo, Rufus H. VanSant, L. B. Herrington and Percy Haly became the Board appointees.[†]

In accordance with the Statutes, Governor James B. McCreary appointed Joseph Bernard Hoeing, who had been employed upon the Shaler, Procter and Norwood surveys in the several positions of Engineer, Cartographer and Assistant Geologist, as State Geologist. Mr. Hoeing took office July 1, 1912, and immediately took charge of the removal of the properties of the Kentucky Geological Survey from the School of Mines at the University of Kentucky, Lexington, Ky., to an old suite of offices on the second floor of the administrative building of the old State Capitol, Frankfort, Ky., where they have ever since been maintained. A large number of mineral resource reports had remained unpublished from the Norwood survey. These Mr. Hoeing placed in the hands of capable assistants for thorough revision, after which they were published as reports of Series IV.

---

[*] Sen. Jour., 1912, p. 637.
[**] Sen. Jour., 1912, p. 972.
[***] Sen. Jour., 1912, p. 1300.
[†] Ky. Geol. Surv., Ser. IV., Vol. 1, Part I, p. 7, 1913.

Hoeing's Life.

Joseph Bernard Hoeing was born in Lexington, Kentucky,** March 27, 1855. Following studies in civil engineering, he was graduated with the C. E. degree from Rensselaer Polytechnic Institute, Troy, N. Y., in 1876.* He was an assistant on the U. S. Coast and Geodetic Survey in Kentucky, from 1876 to 1878. During a portion of this time he was an assistant on the Kentucky Geological Survey under Prof. Shaler. From 1878 to 1880 he was U. S. Deputy Mineral Surveyor of Colorado. From 1881 to 1882 he was on the survey of the Kentucky Union Railroad. In the same year he became chief topographer, cartographer and assistant geologist for the Procter Survey, and served in that capacity until its discontinuance in 1893. In the interim between the Procter and Norwood Survey (1893-1894) he engaged in engineering in Lexington, Ky.

With the reorganization of the Kentucky Geological Survey under Norwood in 1904, he became identified with its activities as Assistant Geologist and Cartographer, at which time he wrote and published his most important contribution to Kentucky geological literature ("Oil and Gas Sands of Kentucky, 233 pp., 3 maps, 1905.") In 1912, at the age of 57, he became State Geologist of the fourth Kentucky Geological Survey under the appointment of Governor James B. McCreary, which office he held until 1918, when on account of legislative action resulting in the combination of the State Board of Forestry with the

---

**Correspondence of Mrs. W. Cromwell, Frankfort, Ky., Aug. 4, 1920.
*Corresp. of Palmer C. Ricketts, Director, R. P. I., July 9, 1921.

Kentucky Geological Survey, under the directorship of John Earle Barton, State Forester, he resigned. Although Mr. Hoeing contributed to the 3rd and 4th Kentucky Geological Surveys a total of 743 pages of geological reports,* he is perhaps best known for his many very excellent county, regional and state maps. In the newly organized Department of Geology and Forestry, Mr. Hoeing was offered the subordinate position as Deputy Commissioner and State Geologist, but declined the offer upon principle.** Since that time he has been engaged in general engineering and geological work in Lexington, Kentucky. His home is 155 Bell Court, West.

Hoeing Survey (1912-1918).

(Series IV)

During the six years (1912-1918) of activity of the (Hoeing) Kentucky Geological Survey, the following technical staff was employed:*** State Geologist, Joseph Bernard Hoeing; Assistant Geologist, A. F. Crider, Arthur McQuiston Miller, August F. Foerste, F. Julius Fohs, James M. Hodge, J. Owen Bryant, Charles Butts, W. C. Phalen, Wallace Lee, E. O. Ulrich, Iley M. Browning, Philip Russell and Malcolm H. Crump; Soil Technologist, S. C. Jones; Cartographer, Lucien M. Sellier; Chemist, A. M. Peter; Clay Technologist, H. D. Easton. The publications of the Kentucky Geological Survey during the Hoeing administration consist of a total of 4,280 pages of new manuscript, published in five volumes (7x10″, red cloth bound), as follows:

	Pages
Vol. I, Part I & II (1913)	1216
Vol. II, Part I (1914)	414
Vol. II, Part II (1914)	360
Vol. II, Part III (1914)	144
Vol. III, Part I (1915)	182
Vol. III, Part II (1915)	270
Vol. III, Part III (1915)	409
Vol. IV, Part I (1916)	234
Vol. IV, Part II (1916)	73
Vol. IV, Part III (1918)	260
Vol. V, Part I (1918)	166
Vol. V, Part II (1919)	552

---

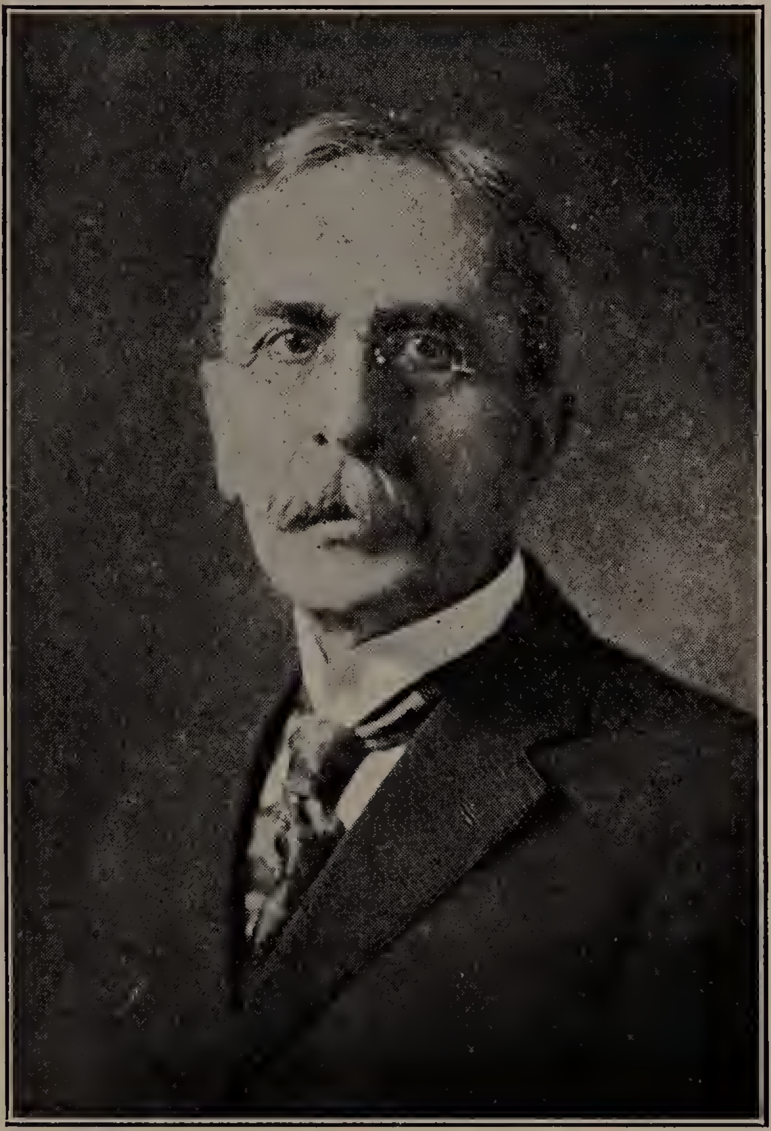
*Geol. of Ky. Bib., p. 375. 1919.

**Private Correspondence of Arthur M. Miller, Lexington, Ky.

***This list includes those employees of the Norwood Survey whose reports were published as a part of Series IV, Hoeing Survey.

Also four miscellaneous reports, totaling 557 pages, distributed as follows:

	Pages
Misc. Rept., "Coals of Clover and Poor Fork (1916)"	64
Misc. Rept., "Phosphate Rocks (1915)"	91
Misc. Rept., "Mississippian Formations (1917)"	119
Misc. Rept., "Chester Series (1917)"	283
Total	4280



7. Joseph Bernard Hoeing.

A review of the activities and literature of the (Hoeing) Kentucky Geological Survey shows that the geological investigations in Kentucky were for the most part satisfactorily carried forward during this period. While due allowance must be made for the large number of inherited manuscripts, which, though requiring authoritative revision, have materially increased the number of separate published reports, the record shows a well balanced policy of economic and scientific investigations. A very large number of coal investigations were carried forward in Eastern and Western Kentucky which have since been very useful in assisting in the development of the mineral resources of these large regions. Two of the most striking deficiencies of the Hoeing survey are: (1) the uniform absence of illustrative material, and (2) adequate indexes to the subject matter. The coal reports, with one or two exceptions, are also largely operators' and promoters' guides, and lack of consideration of the systematic geology of the region and a standard correlation of the coals discussed.

Fifth Reorganization.

The legislature of 1918 was definitely pledged to a general policy of retrenchment and reform. Useless offices were to be abolished, and others consolidated. Among other changes of this kind, it was proposed to abolish completely the State Board of Forestry and the office of State Forester of Kentucky. The committee having this matter in hand, however, finally compromised the action intended, and offered a bill abolishing both the State Board of Forestry (and office of State Forester) and the Kentucky Geological Survey (and office of State Geologist), and at the same time creating to take their places the office of Commissioner of Geology and Forestry. This new bill further provided for a deputy, and fixed the salaries and extended "the appropriation to the Kentucky Geological Survey so as to cover work of same, and that of the State Board of Forestry."* This act, which was approved by Governor A. O. Stanley, March 26, 1918, once more abolished the Kentucky Geological Survey. But in its place it had created the Department of Geology and Forestry, with practically the same officials and appropriations. Politics had played an able unseen hand in this movement, which was engineered by friends of the State Forester, Mr. John Earle Barton. Upon the expiration of the term of office on July 1st of the State Geologist, Mr. Joseph Bernard Hoeing, Governor A. O. Stanley appointed the former State Forester, Mr. Barton, to the newly created position of Commissioner of Geology and Forestry. Through this newly enacted law the new commissioner, an excellent and experienced forester, became the actual head of all the geological as well as the forestry activities in Kentucky.

---

*Acts of the General Assembly, 1918, Chapter 35, pp. 102-103.

Mr. Barton carried forward successfully the office work attached to the new State Department, but did not embark on any definite campaign of geological investigations in the state, feeling, presumably, a natural hesitency to undertake technical work for which he was not specifically trained. This unfortunate condition continued until December, 1918, when Mr. Barton employed Willard Rouse Jillson, then a teacher of geology at the University of Kentucky, as Assistant Geologist, to take charge of the oil and gas work for the Department of Geology and Forestry. This branch of geological investigation, due to the then recent great development of oil and gas in the state of Kentucky, had become so complex, and the correspondence concerning it so heavy and so technical, that this action was forced upon the Commissioner. The work of Professor Jillson was finally brought to the attention of Governor Stanley by Mr. Barton, who advocated his appointment as State Geologist, because of the growing volume and technical nature of the geological work in the Department of Geological and Forestry. The appointment was made by Governor Stanley, February 1, 1919, and Professor Jillson, under the newly enacted statutes, became the Deputy Commissioner of Geology and Forestry, and State Geologist, filling thereby the vacancy which had existed since July, 1918.

THE PRESENT STATE GEOLOGIST.

The newly appointed State Geologist of Kentucky, Dr. Willard Rouse Jillson, was born in Syracuse, N. Y., May 28, 1890, the son of Willard Rogers and Anna Delle (Bailey) Jillson. His boyhood was spent on his father's farm, at Onondaga Hill, where he attended the country schools. He later secured his collegiate and technical training from Syracuse University, University of Washington (Seattle), University of Chicago, and Yale University. He received his B. S. degree from Syracuse University in 1912; M. S. degree from the University of Washington in 1915; and Sc. D. degree from Syracuse University in 1921. He was Instructor in Geology at the University of Washington in 1914-15, and Assistant Professor of Geology at the University of Kentucky in 1918-19, and had done consulting oil and gas geology in the Mid-Continent, Gulf Coast and Southern Appalachian fields for several years prior to his state appointment.* This office came to him in his 29th year, thereby making him the youngest of the seven State Geologists of Kentucky.

Department of Geology and Forestry.

Taking up his duties as State Geologist, Prof. Jillson undertook the organization of the geological work of the newly created Department of Geology and Forestry. These activities were pushed as vigorously as the meager funds which were allotted for this purpose would allow.

The personnel of the Geological Bureau was as follows: State Geologist, Willard Rouse Jillson; Assistant Geologist, Arthur M. Miller and Charles Butts. The publications of the Department of Geology and Forestry were issued in a series of bulletins and mineral resources pamphlets (6x9″), totaling 1,567 pages of new reports, which were distributed as follows:

	Pages
Bulletin No. 1, "Oil and Gas," Willard R. Jillson	646
Bulletin No. 2, "Geology of Kentucky," Arthur M. Miller	422
Bulletin No. 3, "Geology and Coals of Stinking Creek, Knox County, Ky." Willard R. Jillson and J. M. Hodge	103
Bulletin No. 4, "Contributions to Kentucky Geology" (Mineral Resources papers—reprint), W. R. Jillson	266
Mineral and Forest Resources of Kentucky, Vol. I, Parts 1, 2, and 3, by W. R. Jillson, et al.	396

Out of the publications above listed Professor Jillson wrote Bulletins 1, 3 and 4, totaling 1,015 new pages. Mr. Barton during the same time contributed to the Mineral Resources series 42 pages, and to the First Biennial Report of the Department of Geology and Forestry 25 pages, a total of 67 new pages. The departmental publications, issued in editions of 2 and 3 thousand copies, were eagerly taken up by the interested public. Bull. 1, Oil and Gas Resources of Kentucky, went into its third edition within a year and totaled 6,500 copies. This report still finds a steady demand among those interested in oil and gas development in Kentucky.

---

*"Who's Who in America," 1922-23, National Cyclopedia of American Biography, 1923, and "Who's Who in Engineering," 1922-1923

Sixth Reorganization—1920 Geological Survey.

But the internal affairs of the Department of Geology and Forestry did not move along smoothly, much friction arising between the Commissioner of the Department and the State Geologist, due to alleged infringement of the latter's personal rights by the Commissioner, coupled with the continuous practice of apportioning by far the greater part of the geological funds to the various forestry purposes. This bad feeling, culminating in open resentment, resulted in the introduction by Senator Hiram Brock of two bills in the 1920 session of the state legislature. These bills were H. B. 253 and H. B. 261; one for the abolishment of the Department of Geology and Forestry and all its officers, and the other for the reorganization of the

8. Dr. Willard Rouse Jillson.

(Sixth) Kentucky Geological Survey.* A part of the latter bill reorganized the state's forestry work as a bureau of Forestry in the Department of Agriculture, and made a separate appropriation of funds for its maintenance.

These bills aroused strong partisan feeling in the General Assembly, yet were finally supported by both Democrats and Republicans. They were finally passed and approved March 20, 1920, and by reason of the fact that they carried an emergency clause, went into effect immediately. State Forestry work in Kentucky became a Bureau in the Department of Agriculture, and the Kentucky Geological Survey was recreated along essentially similar lines to that of the fourth (Hoeing) Geological Survey. General geological and topographic appropriations were made in figure inadequate to the needs of the State.

JILLSON SURVEY (1920).

(Series VI.)

On April 1, 1920, Governor Edwin P. Morrow appointed Willard R. Jillson Director and State Geologist of the newly organized Kentucky Geological Survey. Dr. Jillson immediately qualified and took charge of the properties of the former Geological Survey, and proceeded with the reorganization of the new survey, which since this time has had the following personnel of full and part-time employees: Director and State Geologist, Willard R. Jillson, Sc. D.; Assistant Geologist, Stuart Weller, Ph. D., Head of the Department of Paleontology, University of Chicago, Chicago, Illinois; L. C. Glenn, Ph. D., Head of the Department of Geology, Vanderbilt University, Nashville, Tenn.; Chas. H. Richardson, Ph. D., Head of the Department of Mineralogy, Syracuse University, Syracuse, N. Y.; Heinrich Ries, Ph. D., Head of the Department of Geology, Cornell University, Ithaca, New York; Walter H. Bucher, Ph. D., Acting Head of the Department of Geology, University of Cincinnati, Cincinnati, Ohio; Arthur M. Miller, A. M., Head of the Department of Geology, University of Kentucky, Lexington, Ky.; Wilbur G. Burroughs, A. M., Head of the Department of Geology, Berea College, Berea, Kentucky; Stuart St. Clair, M. S., formerly Consulting Geologist, Winchester, Kentucky; Charles Butts, M. S., U. S. Geological Survey, Washington, D. C.; Louis W. Currier, M. A., Assistant Professor of Geology, Department of Geology, Syracuse University, Syracuse, New York. Geologic Aides: James S. Hudnall, M. S.; Ben B. Cox, B. S.; A. B. Williams; John S. Carroll; H. V. Tygrett, B. S.; R. A. Jones, A. B,; C. V. Theis, C. E.; George W. Morris, A. B.; L. B. Herring, B. S.; S. M. Mayfield, B. S.; George W. Pirtle. Geographers: Darnell H. Davis, Ph. D., Head of the Department of Geography, University of Minnesota, Minneapolis, Minn.; C. Q. Sauer, Ph. D., Head of the Department of Geography, University of California, Berkeley, Calif.; K. C. McMurray, Ph. D., Head of the Department of Geography, University of Michigan, Ann Arbor, Michigan.; W. R. King, C. E., Hydraulic Engineer, U. S. Geological Survey; W. D. Funkhouser, Ph. D., Head of the Department of Zoology, University of Kentucky, Lexington, Kentucky, Zoologist; Alfred C. Noe, Ph. D., University of Chicago, Chicago, Illinois, Paleobotanist; Rheinhardt Thiessen, U. S. Bureau of Mines, Pittsburgh, Pa.; A. M. Peter, Sc. D., State Chemist, University of Kentucky, Lexington, Kentucky; C. S. Crouse, E. M., University of Kentucky, Lexington, Kentucky, Draftsman and Metallurgist; J. L. Bissell and F. W. Bertsch, Draftsmen; J. Forest Cusick, Photographer; J. M. Frasure, Bookkeeper and Chief Clerk; Catherine B. McNamara, Secretary; Ann Crittenden, Copyist.

---

*Acts of the General Assembly, 1920, Chapters 33 and 34, pages 138 to 146.

The publications of the (Sixth) Kentucky Geological Survey under the direction of Dr. Jillson have been arranged in a series of (6x9″) volumes, bound in cloth. Twenty-five major manuscripts have been completed. Thirteen of these, as noted below, have been published, totaling 3,447 pages.

Vol. 1, "Glass Sands of Kentucky" By Chas. H. Richardson (1920).	149 pp.
Vol. II, "Economic Papers on Ky. Geol." (Edition exhausted).. By Willard R. Jillson (1921).	304 pp.
Vol. III, "Oil Field Stratigraphy of Kentucky," by Willard R. Jillson (1922)	738 pp.
Vol. IV, "Geology of the Golconda Quadrangle," by Stuart Weller (1921)	148 pp.
Vol. V, "Geology and Coals of Webster County," by L. C. Glenn (1922)	249 pp.

Vol. VI. "The Sixth Geological Survey," by Willard R. Jillson, and 10 Miscl. Papers (1921) (Edition exhausted)	291 pp.
Vol. VII, "The Mississippian Series in Eastern Kentucky," by Charles Butts (1922)	188 pp.
Vol. VIII, "Clay Deposits of Kentucky," by Heinrich Ries (1912)	241 pp.
Vol. IX, "Geography of the Jackson Purchase Region," by D. H. Davis (1922)	185 pp.
Vol. X, "Geology of the Princeton Quadrangle," by Stuart Weller, and 4 Miscl. Papers (1923)	163 pp.
Vol. XI, "Building Stones of Kentucky," by Charles H. Richardson ((1923)	357 pp.
Vol. XII, "New Oil Pools in Kentucky," by Willard R. Jillson (1923) (in press).	
Vol. XIII, "Fluorspar Deposits of Kentucky," by Louis Wade Currier (1923)	198 pp.
Vol. XIV, "Surface Waters of Kentucky," by W. R. King (1923) (1923) (in press).	
Vol. XV, "Geological Research in Kentucky," by Willard R. Jillson (1923)	236 pp.
Vol. XVI, "Wild Life in Kentucky," by W. D. Funkhouser (1923) (in press).	
Vol. XVII, "Mineral Resources of Kentucky," by W. R. Jillson (1923) (in press).	
Vol. XVIII, "Geography of the Mountains of Kentucky," by D. H. Davis (1923) (in press).	
Vol. XIX, "Geography of the Kentucky Knobs," by W. G. Burroughs (1923) (in press).	
Vol. XX, "Coal Industry in Kentucky," by W. R. Jillson (1923) (in press).	
Vol. XXI, "Oil Shales of Kentucky," by R. Thiessen, D. White and S. C. Crouse. (1923) (In press).	
Vol. XII, "Road Materials of Kentucky," by Charles H. Richardson. (In press.)	
Vol. XXIII, "Geography of the Blue Grass," by D. H. Davis. (In press.)	
Vol. XXIV, "Geography of the Western Coal Field," by W. G. Burroughs. (Mss.)	
Vol. XXV, "Geography of the Mississippian Plateau," by C. O. Sauer. (Mss.)	

Other manuscript publications taking up the systematic geology of the state of Kentucky and its natural resources are now in the course of preparation, and in the hands of the printer. Thirty-two new county maps showing oil and gas structure, general geology, coal, asphalt, etc., have also been prepared and published.

CONCLUSION.

Any serious consideration of the records and accomplishments of the six Geological Surveys of Kentucky must accredit these organizations with having contributed greatly to the natural and mineral resource expansion and development of the state of Kentucky. In the several surveys themselves many opposing points of natural weakness and inherent strength can be found. The great contributions of the early (Mather and Owen) Surveys were of a pioneering order. The preliminary yet systematically arranged nature of these surveys furnished subsequently in many instances the scientific foundations upon which some of the best investigations of the later surveys were founded. This is true of the topographic mapping which has been carried forward by the later surveys in cooperation with the U. S. Geological Survey until at the present time (July 1, 1921) 18,778 square miles have been completed, leaving 21,820 square miles, or a little more than 50 per cent of Kentucky's 40,598 square miles to be completed.

The Shaler Survey was an especially strong survey, broadly and scientifically devised in scope, and efficiently managed. The Procter Survey did much to popularize geology in Kentucky, but lacked the technical touch found in its predecessors. The Norwood Survey, in its economic reports, especially those of the coal and fluorspar resources, made its greatest contribution. It is most open to criticism, whatever the cause may have been, because of the irregularity of the publication of its completed manuscripts, matters which were legally beyond the control of the State Geologist.

The record of the Hoeing Survey is uniformly good, ranking well with its immediate predecessors. Its publications, however, lack adequate illustrative material, and the proper indexing of the subject matter. Many of its coal resources reports also lack a well balanced consideration of the geology of the region they cover. The accomplishments in the way of new investigations by the Department of Geology and Forestry have been open to much criticism, a large measure of which is justifiable, for very little new or constructive work was undertaken during this administration, except that relating to oil and gas and general geology. The principal reason for this, however, is seen in the inability of the State Geologist to secure adequate funds with which to carry on new field work.

The present (Sixth) Kentucky Geological Survey is but three years old, and it is perhaps now too early to form definite conclusions concerning the measure of its efficiency and service. It may be, however, not out of place for Kentuckians to point with satisfaction to the personnel of the present survey, the leading men of which are recognized American geologists of national reputation. Their record of service and investigation, well known in other fields, is yet to be fully written here. It is earnestly hoped that when this new record is completed it will compare favorably with that of any other present day state geological survey in America.

CHAPTER III.

KENTUCKY GEOLOGICAL SURVEY PUBLICATIONS.

(Chronologically Arranged)

(Independent reports, though bound in a single volume, are numbered separately, since the most of them were originally so issued in paper pamphlet form.)

INDEPENDENT GEOLOGICAL REPORTS.

1838.

MATHER, W. W.

*Report on the Reconnaissance of Kentucky made in 1838. Executive Department, Frankfort, Kentucky. Proceedings of the House of Representatives 238-278. January 3, 1839. First Report of the Geology of Kentucky made December 28, 1838. (Ky. Geol. Surv. Lib., Frankfort. Very rare.)

1847.

OWEN, DAVID DALE, and NORWOOD, JOSEPH GRANVILLE.

*Researches among the Protozoic and Carboniferous Rocks of Central Kentucky made during the summer of 1846. Printed pamphlet paper bound, by Keemle and Field. Reveille Bldg., St. Louis, Mo., in 1847. 12 pp. 1 Plate. 1 Section from Nashville to Salt River, Ky. The second report to be published on the geology of Kentucky, essentially accurate and reliable as to general conclusions. (Louisville Pub. Lib. Rare.) Abstract, Am. Journ. Sci., 2nd Series, Vol. 5, 268-269 pp., 1846.

YANDELL, LUNSFORD P., and SHUMARD, BENJAMIN F.

*Contributions to the Geology of Kentucky, 36 pp., 1 plate. Publishers, Prentice and Weissinger, Louisville, Kentucky. 1847. (Louisville Pub. Lib. Rare.)

---

*The first Kentucky Geological Survey was established by action of the Kentucky General Assembly in 1854. Hence the first three reports (1838 and 1847) here listed are not in any sense Kentucky Geological Survey publications. They are included, however, because of their great historical and scientific importance. Their educational value in moulding public opinion in this State preparatory to the establishment of the original Kentucky Geologcal Survey cannot be over-estimated.

THE KENTUCKY GEOLOGICAL SURVEY.

SERIES I (Old)

(1854-1860.)

DAVID DALE OWEN,
Principal (State) Geologist.
1856.

VOLUME I.

OWEN, DAVID DALE, and others.

Report of the Geological Survey in Kentucky made during the years 1854 and 1855. Printed by A. G. Hodges, State Printer in Frankfort, Kentucky, 1856. 10 maps; profiles, sections, etc., pp. 1-416. Indexed. (Louisville and Lexington Pub. Libs., and State Lib., Frankfort.) 1856.

(Contents as follows:)

OWEN, DAVID DALE.

General Report of (Kentucky) Geological Survey, pp. 15-248. 6 plates.

PETER, ROBERT.

Chemical Report of (Kentucky) Geological Survey, 253-400. 1856. (First Published Chemical Report.)

LYON, SIDNEY S.

Topographical Geographical Report of that portion of Kentucky including Union and part of Crittenden counties, surveyed during the years 1854 and 1855. Pp. 381-400. 1 map and profiles.

1857.

VOLUME II.

OWEN, DAVID DALE, and others.

Second Report of the Geological Survey in Kentucky made during the years 1856 and 1857. Printed by A. G. Hodges, Public Printer in Frankfort, Kentucky, 1857. Pp. 1,391. No plates. Indexed. (Louisville and Lexington Pub. Libs., and State Lib., Frankfort.)

(Contents as follows):

OWEN, DAVID DALE.

General Report of (Kentucky) Geological Survey, pp. 9-114. 1856.

PETER, ROBERT.

Second Chemical Report of (Kentucky) Geological Survey, pp. 129-300. 1856.

LYON, SIDNEY S.

Topographical Report of the (Kentucky) Geological Survey, through Hopkins, Crittenden, Caldwell, Greenup and Carter Counties, made during the years 1856 and 1857. Pp. 300-376.

VOLUME III.

OWEN, DAVID DALE, and others.

Third Report of the Geological Survey in Kentucky, made during the years 1856 and 1857. Printed by A. G. Hodges, Public Printer in Frankfort, Kentucky, 1857. 529 pp., 50 geological sections, 3 plates. Indexed. (Louisville and Lexington Pub. Libs., and State Lib., Frankfort.)

(Contents as follows:)

OWEN, DAVID DALE.

General Report of (Kentucky) Geological Survey, pp. 9-171.

PETER, ROBERT.

Third Chemical Report of the Soils, Marls, Ores, Rocks, Coals, Mineral Waters, &c., of Kentucky. Pp. 177-420. Sept. 14, 1857.

LYON, SIDNEY S.

Topographical Geological Report of the Progress of the Survey of Kentucky in the Counties of Greenup, Carter, Lawrence and Hancock, for the year 1857. (Continuation from Vol. II.) 3 maps. Pp. 425-463. 1857.

Palaeontological Report of (Kentucky) Geological Survey. 10 fossil plates. Pp. 468-498 (?). 1857.

1861.

VOLUME IV.

OWEN, DAVID DALE, and others.

Fourth Report of the Geological Survey in Kentucky, made during the years of 1858 and 1859. Printed by J. B. Major, State Printer, in Frankfort, Kentucky. 1861. 104 sections. 2 maps. Indexed. Pp. 617. (Louisville and Lexington Pub. Libs., and State Lib., Frankfort.)

(Contents as follows:)

OWEN, DAVID DALE.

General Report of (Kentucky) Geological Survey, pp. 7-37.

PETER, ROBERT.

Fourth Chemical Report of the Soils, Marls, Ores, Rocks, Coals, Iron Furnace Products, Mineral Waters, etc., etc., of Kentucky. Pp. 39-321. Feb. 4, 1860. Contains a Summary of the Chemical Analyses of the State Chemist.

LESQUEREUX, LEO.

Report of Fossil Flora and of the Stratigraphical Distribution of the Coal in the Kentucky Coal Fields. Pp. 331-437. 4 pl. (lost?). January 31, 1860. First Palaeontological Report of Kentucky Geological Survey.

LESLIE, JOSEPH, JR.

Topographical and Geological Report of the Country along the Outcrop Base Line, Following the Western Margin of the Eastern Coal Field of the State of Kentucky, through the Counties of Carter, Rowan, Morgan, Bath, Montgomery, Powell, Estill, Owsley, Jackson, Rockcastle, Pulaski, Wayne and Clinton. From a survey made during the years 1858-9. Pp. 439-494. 6 Draw. Nov. 1, 1859.

LYON, SIDNEY S.

Topographical Geological Report of the Progress of the Survey of Kentucky for the years 1858 and 1859. Pp. 494-599. 48 Sections.

(End of the Owen Survey.)

SERIES II (New)

(1873-1880.)

N. S. SHALER, Director.

1876.

VOLUME I.

(Contents.)

SHALER, N. S., and others.

Reports of Progress (1873-75), stereotyped by Major, Johnston and Barrett; Printed by John P. Morton & Co., 156 and 158 West Main St., Louisville, Kentucky, for the Survey at Frankfort, Ky. 520 pp. 1876. (Louisville, Lexington Pub. Libs., and State Lib., Frankfort.)

SHALER, N. S., and CRANDALL, A. R.

Report on the Forests of Greenup, Carter, Boyd and Lawrence Counties (Part I), pp. 1-26, no date.

HUSSEY, JOHN.

Report on the Botany of Barren and Edmonson Counties (Part II). Introduction by N. S. Shaler. Pp. 27-58. March 15, 1875.

MOORE, P. N.

Report on the Iron Ores of Greenup, Boyd and Carter Counties (The Kentucky Division of the Hanging Iron Region) (Part III), pp. 59-136, 1 Draw., no date.

PETER, ROBERT, and TALBUTT, JOHN H.

Chemical Report of the Soils, Marls, Clays, Ores, Coals, Iron Furnace Products, Mineral Waters, &c., &c., of Kentucky. (1873-1875) April 19, 1875; (Part IV), pp. 137-316, 9 plates.

MOORE, P. N.

The Iron Manufacture of the Kentucky Division of the Hanging Rock Iron Region. (Part V), pp. 317-353, 5 sections, 1 plate.

NORWOOD, CHARLES J.

Report on the Geology of the Region Adjacent to the Louisville, Paducah and Southwestern Railroad, with a Section. (Part VI), pp. 357-451, 4 plates. May 5, 1875.

Report of a Reconnaissance in the Lead Region of Livingston, Crittenden and Caldwell Counties, including a Sketch of Their General Wealth. (Part VII), pp. 449-493, 1 map, 4 plates April 15, 1875.

VOLUME 1* (Memoirs).

(Contents.)

SHALER, N. S., and others.

Memoirs of the Geological Survey of Kentucky, Vol. I, University Press, Cambridge (Mass.), Welch, Bigelow & Co. 309 pp. 27 plts., 1 map, 1876. No index. (Louisville and Lexington Pub. Libs., and State Lib., Frankfort.)

SHALER, N. S.

On the Antiquity of the Caverns and Cavern Life of the Ohio Valley. (Part I), pp. 1-13, 1 plate. Dec. 2, 1874.

ALLEN, J. A.

The American Bisons, Living and Extinct. (Part II), 12 plates and map, pp. 1-221. May 24, 1876.

SHALER, N. S.

On the Fossil Brachiopods of the Ohio Valley. (Part III), pp. 3-44, 7 plates.

CARR, LUCIEN, and SHALER, N. S.

On the Prehistoric Remains of Kentucky. (Part IV), pp. 3-31, 7 plates.

1877.

VOLUME II.

(Contents.)

SHALER, N. S., and others.

Reports of Progress (Stereotyped for the Survey by Major, Johnston & Barrett; Yeoman Press, Frankfort, Kentucky, 468 pp., indexed, 1877). (Louisville and Lexington Pub., Libs., and State Lib., Frankfort.)

CRANDALL, A. R.

Report on the Geology of Greenup, Carter and Boyd Counties, and a part of Lawrence. (Part I), pp. 1-78, 1 map, 2 draw., 1 geological section, 3 profile sections, 31 plates, 1877.

---

*As originally planned Vol. 1 of the Memoirs included six parts, only four of which, those here given, are known to have been printed. For proposed titles 5 and 6 see A. R. Hasse, Index to Documents of the State of Kentucky, p. 305, Shaler Survey, C.

MOORE, P. N.

Report on the Geology of the Nolin River District, Embracing Portions of Grayson, Edmonson, Hart and Butler Counties. (Part II), pp. 79-134, 1 section, 3 cross-sections, 1877.

PETER, ROBERT.

Chemical Examination of the Ashes of the Hemp and Buckwheat Plants, with Remarks on its Bearing on Hemp Culture in Kentucky. (Part III), pp. 135-160, 1877.

MOORE, P. N.

Report upon the Airdrie Furnace and Property, Muhlenberg County, Kentucky. (Part IV), pp. 161-188. December, 1874.

PAGE, WILLIAM BYRD.

Topographical Report of the Nolin River District. (Part V), pp. 190-200.

NORWOOD, C. J.

Report of a Reconnaissance on the Proposed Line of Railway from Livingston Station to Cumberland Gap. (Part VI), pp. 201-244, 1 preliminary section. August 1875.

A Reconnaissance Report of the Lead Region of Henry County, With Some Notes on Owen and Franklin Counties. (Part VII), pp. 245-276, 3 plates. December 1, 1875.

SHALER, N. S.

On the Origin of the Galena Deposits of the Upper Cambrian Rocks of Kentucky. (Part VIII), pp. 277-330, 1 draw., 1 plate, no date.

DE FRIESE, LAYFETTE H.

Report on the Timbers of the Grayson, Breckinridge, Ohio and Hancock Counties. (Part IX), pp. 332-350, 1 diagram, 1876.

CRANDALL, A. R.

Report on the Geology of the Proposed Line of the Elizabethtown, Lexington and Big Sandy Railroad from Mt. Sterling to the Big Sandy River. (Part X), 1 geological section, 1 map, no date.

SHALER, N. S., and others.

A General Account of the Commonwealth of Kentucky. (Preliminary map.) (Part XI), pp. 361-468, May 10, 1876.

CRANDALL, A. R.

Brief Statement of the Economic Geology of the Big Sandy Valley, pp. 407-408.

NORWOOD, C. J.

General Resources of the Western Coal Field and Bordering Territory, pp. 409-426.

MOORE, P. N.
The Iron Ores of Kentucky, pp. 427-438.

PETER, R.
Chemical Geology of Kentucky, pp. 439-451.

VOLUME III
(Contents.)

SHALER, N. S.

Reports of Progress 1873-1877. Stereotyped for the Survey by Major, Johnston and Barrett, Yeoman Press, Frankfort, Kentucky, 1877. (Louisville and Lexington Pub. Libs., and State Lib., Frankfort.)

General Report of the Geological Survey of Kentucky. (Part I), pp. 1-30.

History of the Operations of the Survey in 1874 and 1875 (from 1854 to 1860). (Part II), pp. 31-128, 1 section, 1 diagram.

Notes on the Investigations of the Geological Survey During the Years 1873, 1874 and 1875. (Part III), pp. 129-282, 5 sections, 4 drawings.

Annual Report for the Year 1876. (Part IV), pp. 283-315.

The Transportation Routes of Kentucky and Their Relation to the Economic Resources of the Commonwealth. (Part V), pp. 316-346.

Description of the Preliminary Topographical and Geological Maps of Kentucky, Edition of 1877. (Part VI), pp. 347-364.

Annual Report for the Year 1877. (Part VII), pp. 365-383.

Notes on the Problems Encountered by the Geological Survey During the Year 1877. (Part VII), pp. 384-414.

Report of the Unfinished Work of the Commonwealth Under the Direction of Dr. David Dale Owen. (Part VIII), pp. 415-425.

1878.

VOLUME IV.
(Contents.)

SHALER, N. S., and others.
Reports of Progress 1875-1876. Stereotyped for the Survey by Major, Johnston and Barrett, Yeoman Press, Frankfort, Kentucky, 1878. 461 pp., indexed. (Louisville and Lexington Pub. Libs., and State Lib., Frankfort.)

PETER, ROBERT, and TALBUTT, JOHN H.
Chemical Report of the Soils, Coals, Ores, Iron Furnace Products, Clays, Marls, Mineral Waters, Rocks, &c., of Kentucky. (Part I), pp. 1-166, February, 1877.

CRANDALL, A. R.
Report on the Geology of Menifee County. (Part II), pp. 167-182, 3 plates, 1 profile section.

MOORE, P. N.

Report on the Iron Ores and the Iron Manufacture of the Kentucky Red River Iron Region. (Part III), pp. 183-216. (Drawing of the Blast Furnaces of the Red River Iron Region accompanies this report.)

Report on a Geological Reconnaissance of the Region Adjacent to the Kentucky and Virginia State Line, from Cumberland Gap to the Chatterawha or Big Sandy River. (Part IV), pp. 217-240, 5 sections.

Report on the Iron Ores in the Vicinity of Cumberland Gap. (Part V), pp. 241-254.

Report on the Geology of a Section from Near Campton, Wolfe County, to the Mouth of Troublesome Creek, Breathitt County. (Part VI), pp. 255-284, 1 preliminary section.

NORWOOD, CHARLES J.

A Report of Examinations made along the paths of the North and South Running Railways in Western Kentucky. (Part VII), pp. 285-338, 5 plates.

A Report of Reconnaissance of a part of the Breckinridge Cannel Coal District. (Part VIII), pp. 339-364. 1875.

DE FRIESE, LAYFETTE H.

Report on the Timbers of the North Cumberland, Bell and Harlan Counties. (Part IX), pp. 365-368.

MOORE, P. N.

On the Geology of Hancock County. (Part X), pp. 389-422, 4 plates, 2 maps, scale: 1:60,000.

On the Geology of the Region Adjacent to the Eastern Border of the Western Coal Field, from the Louisville, Paducah and Southwestern Railway to the Ohio River. (Part XI), pp. 423-444.

CRANDALL, A. R., and MOORE, P. N.

On the Geology of Portions of the Upper Cumberland River Valley, in Bell and Harlan Counties. (Part XII), pp. 445-454, 10 sections.

1879.

BULLETIN 1.

SHALER, N. S., and others.

Bulletin of the Kentucky Geological Survey—No. 1, 100 pp., 2 Plates. Printed by E. H. Porter, Public Printer, Yeoman Office, Frankfort, Ky., 1879. Contains the following: (A.-F.). (Louisville and Lexington Pub. Libs., and State Lib., Frankfort, Ky.)

(A) Introduction, pp. 3 and 4.

(B) Petroleum, pp. 5-12.

(C) On the Improvement of the Rivers of Kentucky, pp. 13-21.

SHALER, N. S., and PROCTER, JOHN R.

(D) On the Importance of Improvement in the Navigation of the Kentucky River to the Mining and Manufacturing of Kentucky, pp. 22-45.

CALDWELL, W. B., JR.

(E) Iron Ores and Coals—Advantages of Western Kentucky for the manufacture of Iron, pp. 46-59. Reprinted from the (Louisville) Courier-Journal, March 9, 1878.

PROCTER, JOHN R.

(F) Notes on the Yellow Fever Epidemic at Hickman, Kentucky, pp. 61-100, 2 plates, appendix, 1878.

1880.

VOLUME V.

(Contents.)

SHALER, N. S., and others.

Geological Survey of Kentucky. Reports of Progress 1878 and 1880. Stereotyped for the Survey by Major, Johnston and Barrett. Yeoman Press, Frankfort, Kentucky, 1880. 505 pp., indexed. (Louisville and Lexington Pub. Libs., and State Lib., Frankfort.)

SHALER, N. S.

Introduction to Fifth Volume.

PAGE, WILLIAM BYRD.

Description of the Topography of the Area Included Within the Reconnaissance Triangulation of the U. S. Coast Survey in Kentucky During the Seasons of 1875 and 1876. (Part I), pp. 3-10, March 1, 1877.

SCHENK, C.

Topographical Report of a Part of Greenup and Lawrence Counties for the year 1874. (Part II), pp. 11-22.

On the Use of the Telemeter in Topographical Surveys. (Part III), pp. 23-42, 5 figures.

DE FRIESE, LAFAYETTE H.

Report on the Timbers of the Tradewater Region, Caldwell, Lyon, Crittenden, Hopkins, Webster and Union Counties. (Part IV), pp. 45-76, Sept. 17, 1877.

NORWOOD, CHARLES J.

A General Account of the Geology of a Part of Ohio County. (Part V), pp. 77-124.

DE FRIESE, LAYFETTE H.

Report on the Timbers of the District West of the Tennessee River. Commonly known as the Purchase District. (Part VI), pp. 125-158. November, 1877.

PETER, ROBERT.

Chemical Report of the Soils, Coals, Ores, Iron Furnace Products, Clays, Marls, Mineral Waters, Rocks, etc., of Kentucky. (Part VII), pp. 159-250. Two microscopic photographs. April, 1878. This is the Third Chemical Report in the 2nd, or new series, and the Seventh since the beginning of the Kentucky Geological Survey.

CALDWELL, WM. B., JR.

Report on the Limonite Ores of Trigg, Lyon and Caldwell Counties, known as the "Cumberland River Ores." (Part VIII), pp. 251-264.

Iron: The Impurities Which Commonly Occur With It, and Their Effects. (Part IX), pp. 265-288.

DEFRIESSE, LAFAYETTE H.

Report on a Belt of Kentucky Timbers, Extending East and West Along the South-Central Part of the State, from Columbus to Pound Gap. (Part X), pp. 287-348. February, 1879.

LINNEY, W. M.

Report on the Timber of Boyle and Mercer Counties. (Part XI), pp. 351-384. July, 1879.

CRANDALL, A. R.

Report on the Chinn's Branch Cannel Coal District. (Part XII), pp. 385-394.

PETER, ROBERT.

Chemical Report of the Soils, Coals, Ores, Clays, Marls, Mineral Waters, Rocks, &c., of Kentucky. (Part XIII), pp. 395-487. This is the Fourth Report in the New Series and the Eighth since the Beginning of the Geological Survey.

VOLUME VI.

(Contents.)

SHALER, N. S., and others.

Geological Survey of the Kentucky (Reports), 338 pp., stereotyped for the Survey by Major, Johnston and Barrett, Yeoman Press, Frankfort, Ky., Oct. 26, 1880.

PETER, ROBERT.

Thoughts on the Agricultural, Manufactural, and Educational Interests of Kentucky, suggested by a study of the Great International Centennial Exhibition of 1876. (Part I.)

PROCTER, JOHN R.

Culture of Flax and Hemp. (Part II), 15 illustrations, pp. 146-218, Feb. 25, 1880.

On the Pottery Clays of Kentucky, and Their Uses.

MOORE, P. N.

Report on Coal Washing for the Separation of Coal from its impurities. Vol. VI, Part III. 40 pp., 7 plates. Pub. as a paper pamphlet. Stereotyped for the Survey by Major, Johnston and Barrett, Yeoman Press, Frankfort, Ky. No date. (Ky. Geol. Surv. Lib., Frankfort. Very rare.)

PROCTER, JOHN R.

Resources of the North Cumberland Valley comprising parts of Whitley, Knox, Bell, Harlan and Letcher Counties. Vol. VI, Part IV, pp. 291-314. 1 geologic diagram. Published as a paper pamphlet. Stereotyped for the Survey by Major, Johnston and Barrett, Yeoman Press, Frankfort, Ky. Dated Oct. 26, 1880. (Ky. Geol. Surv. Lib., Frankfort. Very rare.)

CRANDALL, A. R.

Preliminary Report on the Geology of Morgan, Johnson, Magoffin and Floyd Counties. (With map.) Vol. VI, Part V, pp. 315-324. Four geologic section plates. One geologic diagram. Published as a paper pamphlet. Stereotyped for the Survey by Major, Johnston and Barrett, Yeoman Press, Frankfort, Ky. No date. (State Lib., Frankfort. Rare.)

KENTUCKY GEOLOGICAL SURVEY AND BUREAU OF IMMIGRATION.

SERIES II (New)

JOHN R. PROCTER, Director.

(Ap. 26, 1880-1892.)

IMMIGRATION REPORTS.

1880.

PROCTER, JOHN R.

Die Materiellan Verhaltnisse und Vortheile fur Einwanderer im Staate Kentucky. 96 pp., 26 photo. plates, 1 Kentucky map. Electrotyped for the Director of the Bureau of Immigration by Major, Johnston and Barrett, Frankfort, August, 1880. (Ky. Geol. Survey Lib., Frankfort. Rare.)

1881.

PROCTER, JOHN R.

Die Materiellen Verhaltnisse und Vortheile fur Einwanderer im Staate Kentucky, Vereinigte Staaten von Amerika. Zweite Auflage. Frankfort, Kentucky: Electrotypirt fur den Direktor des Bureau's fur Einwanderung. Von Major, Johnston and Barrett, Feb. 1, 1881., pp. 1-10. (Ky. Geol. Survey Lib., Frankfort. Rare.)

(Contents as follows, A-L inclu.:)

(A) Vorwort. (Preface), pp. (5-9). 1881.

FRANKE, KARL L.

(B) Einleitung. 1 p. Louisville, Ky., May, 1880.

PROCTER, JOHN R.

(C) Kentucky. Acht Briefe (eight serial letters).

(D) Anhang A. (Supplement.) pp. 1-8.

(E) Anhang B. (Supplement.) pp. 1-3.

(F) Anhang C. (Supplement.) pp. 1-6.

(G) Anhang D. (Supplement.) pp. 1-10.

SCHENK, C.

(H) (Supplement.) pp. 1-3.

CANN, STUART.

(I) Die Kohlen-Minen in Kentucky, Anhang (Supplement) F., pp. 1-8.

FRANKE, KARL L.

(J) Die Ergeknisse der Ernte der Boden-Erzeugnisse Kentucky's in der Jahren 1876-1879. Anhang. (Supplement) G, pp. 1-4

PROCTER, JOHN R.

(K) Die Bevolkerung von Kentucky in Jahre 1880. Anhang (Supplement) H, pp 1-3.

BRUNNER, OTTO.

(L) Ein offener Brief von Otto Brunner aus Bern, an die Auswanderungslustigen gerichtet. Anhang (Supplement) I, pp. 1-5, 1 map.

PROCTER, JOHN R.

Information for Emigrants. The Climate, Soils, Timbers, &c., of Kentucky, Contrasted with Those of the Northwest, pp. 1-29, 1 map. Printed at the Kentucky Yeoman Office, Frankfort, Kentucky. S. I. M. Major, Public Printer. 1881.

Kentucky (data on the Commonwealth), pp. 1-3. Printed on back of Map of Kentucky (Geological), Scale 26½ miles to the inch.

Mittheilungen fur Auswanderer. Klima, Walder, u. f. w. von Kentucky, Verglichen mit denen des Norwestens, pp. 1-34. Major, Johnston and Barrett, Public Printers, Frankfort, Ky., 1881.

To The Farmers of Great Brittain, pp. 1-15, 1 figure map.

Kentucky Geologiska Och Invandrings-Byra, pp. 1-13. Printed on back of Map of Kentucky (Geological), Scale, 26½ miles equals 1 inch.

Underrattelse For Utvandraren, Kentucky. 1 Forhallande Till Nordvestern, pp. 1-31.

McHENRY, HENRY D.

Der Helvetia-Verein und die Einwanderung, pp. 1-10.

BRUNNER, OTTO.

Die Schweizer—Colonie, "Bernstadt," in Laurel County, Kentucky, Nord-Amerika, pp. 2-8, 6 draw.

Thoughts on Emigration and Colonization in View of the Formation of a Swiss-American Colonization Society in the Canton of Zurich, pp. 1-20. Bernstadt, Ky., Sept. 24, 1881.

Betrachtungen uber Emigration und Colonisation behufs Bilhung einer schweizerisch—Amerikanischen Colonisations—Gesellschaft im canton Zurich, pp. 1-18. Bernstadt, Ky., den. 24, Sep, 1881.

1882.

Die Schweizer-Colonie "Bernstadt," in Laurel County, Kentucky, Nord-Amerika. Die Eindrucke und Resultate des ersten Y ahres ihrer Eristenz. pp. 1-16. Frankfort, Kentucky. Bureau of Immigration. Printed by Major, Johnson and Barrett, 1882. (Ky. Geol. Survey Lib., Frankfort. Rare.)

PROCTER, JOHN R.

About Immigration—Gratifying Success of the Swiss Colony in Laurel—Still hopeful of Rugby—The Character and Value of Foreign Immigration, and the Fallacy of the Over-Population Fear, pp. 1-12. (Title an article reprinted from the Louisville Courier-Journal Sunday, June 11, 1882) (Ky. Geol. Survey Lib., Frankfort. Rare.)

GRUNIGEN, JOHANN VON.

Eine Kurze Beschreibung der Saaner—Kolonie, Nahe bei Stanford, in Lincoln County, Kentucky. pp. 1-16, Kentucky Bureau for Geology and Immigration. Printed by Major, Johnston and Barrett, Frankfort, Ky. 1882. (Ky. Geol. Surv. Lib., Frankfort. Rare.)

ROSEL, ALOIS.

Mahrer Bericht uber Auswanderung und Ansiedlung. 59 pp. Kentucky Bureau fur Geologie und Einwanderung. Printed by Major, Johnston and Barrett, Frankfort, Ky. 1882. (Ky. Geol. Surv. Lib., Frankfort. Rare.)

UELTSCHI, ROBERT; WAEGLI, Co.; ROSEL, ALOIS, etc. 1882, 1883, 1884.

Serial Letters, concerning Immigration and Colonization in Kentucky. Nos. 12 to 36 inclusive. Total Number of Pages, 157. Kentucky Bureau fur Geologie und Einwanderung. Frankfort, Kentucky. 1882-83-84. (Ky. Geol. Surv. Lib., Frankfort. Rare.)

1883.

WAYMAN, JAMES.

A Good Home for Immigrants. No. 22. 8 pp. Paper pamphlet. No. 19, 1883. (Ky. Geol. Surv. Lib., Frankfort. Rare.)

Impressions of Kentucky, No. 26. 19 pp. Dec. 19, 1883. (Ky. Geol. Surv. Lib., and State Lib., Frankfort. Rare.)

1884.

POWELL, E. D.

Cultivation of Apples. 10 pp. Paper pamphlet No. 38. (Ky. Geol. Surv. Lib., Frankfort. Rare.)

DECKER, J.

Culture of Small Fruits. 2 pp. Paper pamphlet No. 38. (Ky. Geol. Survey Lib., Frankfort. Rare.)

GEOLOGICAL REPORTS.

1880.

PROCTER, JOHN R.

Report on the Resources of the Region Adjacent to the Paris, Georgetown and Frankfort Railway. 20 pp., 1 geologic diagram, 1 geographic map of Kentucky, showing coal fields and proposed route of Paris, Georgetown and Frankfort R. R. Scale: 2½ in.-sixty miles. No publisher named. Dated Dec. 4, 1880. (Ky. Geol. Surv. Lib., Frankfort. Rare.)

1881.

Report on the Resources of the Region Adjacent to the Kentucky Union Railway Company. 12 pp., 1 geologic diagram. Yeoman Print, Frankfort, Ky. Dated Jan 29, 1881. (Louisville Pub. Lib., State Lib., Frankfort.)

VOL. II* (Memoirs)

(Contents)

CARR, LUCIEN

The Mounds of the Mississippi Valley, historically considered. (Part I.) p. 107. Latest reference given is 1881. Frankfort Yeoman Press.

1882.

PROCTER, JOHN R.

Report on the Progress of the Survey from May 1, 1880, to January 1, 1882, pp. 1-19. Printed at the Kentucky Yeoman Office, Frankfort, Kentucky, S. I. M. Major, Public Printer, 1882. (Louisville, Lexington Pub. Libs., and State Lib., Frankfort.)

LINNEY, W. M.

Notes on the Rocks of Central Kentucky, with list of Fossils. 19 pp. Bound as a paper pamphlet. Stereotyped for the survey by Major, Johnston & Barrett, Yeoman Press, Frankfort, Ky., Nov., 1882. (Ky. Geol. Surv. Lib., Frankfort. Very Rare.)

Report on the Geology of Washington County. 24 pp., 1 appendix, 1 geologic (colored) map (Washington and Marion Counties). Scale: 1 in.=2 miles. Bound as a paper pamphlet. Stereotyped for the Survey by Major, Johnston & Barrett, Yeoman Press, Frankfort, Ky. Nov., 1882. (Ky. Geol. Surv. Lib., Frankfort. Very rare.)

Report on the Botany of Madison, Lincoln, Garrard, Washington and Marion Counties, Kentucky. 58 pp. Bound as a paper pamphlet. Stereotyped for the Survey by Major, Johnston & Barrett, Yeoman Press, Frankfort, Ky., Dec., 1882, (Ky. Geol. Surv. Lib., Frankfort. Very rare.)

Report on the Geology of Lincoln County. 36 pp., 1 appendix, 1 geologic (colored) map. Scale: 1 in.=2 miles. Bound as a paper pamphlet. Stereotyped for the Survey by Major, Johnston & Barrett, Yeoman Press, Frankfort, Ky., Dec., 1882. (Louisville Pub. Lib. Rare.)

Report on the Geology of Garrard County. 31 pp,, 1 appendix A, 1 geologic (colored) map. Scale: 1 in.=2 miles. Bound as a paper pamphlet. Stereotyped for the Survey by Major, Johnston & Barrett, Yeoman Press, Frankfort, Ky., Dec., 1882. (Ky. Geol. Surv. Lib., Frankfort. Very rare.)

Report on the Geology of Mercer County. 29 pp., 1 appendix A, 1 geologic (colored) map (Boyle and Mercer Counties). Scale: 1 in.=2 miles. Bound as a paper pamphlet. Stereotyped for the Survey by Major, Johnston & Barrett, Yeoman Press, Frankfort, Ky., Dec. 1882. (Ky. Geol. Surv. Lib., Frankfort. Very rare.)

---

*Vol. II. of the Memoirs of the Kentucky Geological Survey was never completed. Various titles have been ascribed to it but without any real authority. See Hasse, A. R., p. 305, Shaler Survey, C.

PETER, ROBERT.

Comparative Views of the Composition of the Soils, Limestones, Clays, Marls, &c., &c., of the Several Geological Formations of Kentucky, as Shown by the Chemical Analyses Published in the Several Reports of the Geological Survey of the State, with Remarks on their Characters and Practical Uses. Pp. 1-62, 1 map, 1883. (State Lib., Frankfort. Rare.)

GARMAN, SAMUEL.

On the Reptiles and Batrachians. Nine plates, 1 drawing, pp. 1-185, indexed. University Press, Cambridge, Mass., 1883.

1884.

PROCTER, JOHN R.

Report on the Progress of the Survey from January, 1882, to January, 1884, pp. 20-59. Printed at the Kentucky Yeoman Office, Frankfort, Kentucky. S. I. M. Major, Public Printer, 1884. (State Lib., Frankfort. Rare.)

LINNEY, W. M.

Report on the Geology of Spencer County, 20 pp., 1 appendix, 1 geologic (colored) map (Spencer and Nelson Counties). Scale: 1 inch=2 miles. Bound as a paper pamphlet. Stereotyped for the Survey by Major, Johnson & Barrett, Yeoman Press, Frankfort, Jan., 1884. (Ky. Geol. Surv., Lib., Frankfort. Very rare.)

Report on the Geology of Nelson County 38 pp. Appendix A and B, 1 geologic (colored) map (Spencer and Nelson counties); Scale: 1 inch=2 miles. Bound as a paper pamphlet. John D. Woods, Public Printer. Jan., 1884. (State Lib. and Ky. Geol. Surv. Lib., Frankfort. Rare.)

Report on the Geology of Clark County, pp. 1-44, 1 appendix, 1 geologic (colored) map of Clark and Montgomery Counties. Scale: 1 inch=2 miles. Published with the following report on Montgomery County, in paper pamphlet, by John D. Woods, Public Printer and Binder. Dated Dec., 1884. (Louisville Pub. Lib. and State Lib, Frankfort. Rare.)

Report on the Geology of Montgomery County, pp. 45-76, 1 appendix, 1 geologic (colored) map of Clark and Montgomery Counties. Scale: 1 inch=2 miles. Published with the preceding report on Clark County, in paper pamphlet, by John D. Woods, Public Printer and Binder. Dated Dec., 1884. (Louisville Pub. Lib. and State Lib., Frankfort. Rare.)

1884.

PETER, ROBERT; TALBUTT, JOHN H., and PETER, A. M.

Chemical Analyses A. (Vol. A, Part I.) First, Second and Third Chemical Reports, and Chemical Analyses of the Hemp and Buckwheat Plants. Part I, 477 pp., indexed. This volume is a compiled report of the early chemical reports of the Shaler Survey. Stereotyped for the Survey by E. Polk Johnson, Public Printer. 1884. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

(Contents as follows:)

(The following 4 titles are reprints from Shaler Survey.)
Chemical Report of the Soils, Marls, Clays, Ores, Coals, Iron Furnace Products, Mineral Waters, etc., etc., of Kentucky, by Peter, Robert, and Talbutt, John H., pp. 1-180. 1875.

Chemical Report of the Soils, Coals, Ores, Iron Furnace Products, Clays, Marls, Mineral Waters, Rocks, etc., of Kentucky, by Peter, Robert, and Talbutt, John H., pp. 181-345. 1877.

Chemical Report of the Soils, Coals, Ores, Iron Furnace Products, Clays, Marls, Mineral Waters, Rocks, etc., of Kentucky, by Peter, Robert. pp. 347-438. 1878.

Chemical Examination of the Ashes of the Hemp and Buckwheat Plants, with Remarks on its Bearing on Hemp Culture in Kentucky, by Peter, Robert.; pp. 439-463.

PROCTER, JOHN R.; SHALER, N. S., and others.
Eastern Coal Field (Vol.) C, Comprising Eight Reports on the Resources of some of the Counties located in the Eastern Coal Field. 305 pp., indexed. A compiled reprint of the reports of the Shaler Survey. Stereotyped for the Survey by Major, Johnston & Barrett. Yeoman Press, Frankfort, Ky. 1884. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

(Contents as follows.)

PROCTER, JOHN R.
Preface to Second Edition (New Series).

(The following 8 titles are all reprints from Shaler Survey.)
Report on the Geology of Greenup, Carter and Boyd Counties, and a part of Lawrence, by Crandall, A. R.; pp. 1-77, 31 sectional plates, 1 map.

Report on the Iron Ores of Greenup, Boyd and Carter Counties, The Kentucky Division of the Hanging Rock Iron Region, by Moore, P. N., pp. 79-156.

The Iron Manufacture of the Kentucky Division of the Hanging Rock Iron Region. By Moore, P. N., pp. 157-193.

Report on the Geology of Menifee County, by Crandall, A. R., pp. 195-209, 4 plates.

Report on the Iron Ores, and the Iron Manufacture of the Kentucky Red River Iron Region, by Moore, P. N., pp. 211-244.

Report on the Iron Ores in the Vicinity of Cumberland Gap. By Moore, P. N., pp. 245-258.

Report on the Geology of a Section from near Campton, Wolfe County, to the south of Troublesome Creek, Breathitt County, by Moore, P. N., pp. 259-288.

Report on the Chinn's Branch Cannel Coal District, by Crandall, A. R., pp. 289-298, 1 map.

1884.

PROCTER, JOHN R.; SHALER, N. S., and others.

Timber and Botany. (Vol.) B. Comprising Seven Reports on the Forests and Botany of Different Parts of the State. 238 pp. Indexed. A compiled reprint of reports of the Shaler Survey. Stereotyped for the Survey by Major, Johnston & Barrett, Yeoman Press, Frankfort, Kentucky. 1884. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

(Contents as follows:)

PROCTER, JOHN R.

Preface to Second Edition (New Series), pp. III and IV.

(The following 7 titles are reprints from Shaler Survey.)

Report on the Forests of Greenup, Carter, Boyd and Lawrence Counties, by Shaler, N. S., and Crandall, A. R., pp. 1-26.

Report on the Botany of Barren and Edmonson Counties, by Hussey, John, with an introduction by Shaler, N. S., pp. 27-58.

Report on the Timbers of Grayson, Breckinridge, Ohio and Hancock Counties, by De Friese, L. H., pp. 59-78.

Report on the Timbers of the North Cumberland, Bell and Harlan Counties, by De Friese, Lafayette H., pp. 79-103.

Report on the Timbers of the Tradewater Region, Caldwell, Lyon, Crittenden, Hopkins, Webster and Union Counties, by De Friese, Lafayette H., pp. 103-136.

Report on the Timbers of the District West of the Tennessee River, commonly known as the Purchase District, by De Friese, L. H., pp. 137-170.

Report on a Belt of Kentucky Timbers, Extending East and West along the South Central Part of the State, from Columbus to Round Gap. By De Friese, Lafayette H., pp. 171-232.

1884.

PROCTER, JOHN R.; SHALER, N. S., and others.

Western Coal Field. (Vol.) D. Comprising Six Reports on the Resources of Some of the Counties Located in the Western Coal Field. 222 pp. Indexed. A compiled reprint of reports of the Shaler Survey. Stereotyped for the Survey by Major, Johnston and Barrett. Yeoman Press, Frankfort, Ky. 1884. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

(Contents as follows:)

PROCTER, JOHN R.

Preface to Second Edition (New Series).

(The following 6 titles are reprints from the Shaler Survey.)

Report on the Geology of the Nolin River District, Embracing Portions of Grayson, Edmonson, Hart and Butler Counties, by Moore, P. N., 68 pp.

Report upon the Airdrie Furnace and Property, Muhlenberg County, Kentucky, by Moore, P. N., pp. 68-96.

On the Geology of Hancock County, by Moore, P. N., pp. 97-120.

A General Account of the Geology of a part of Ohio County. By Norwood, Charles J., pp. 131-177.

Report on the Limonite Ores of Trigg, Lyon and Caldwell Counties known as the "Cumberland River Ores," by Caldwell, Wm. B., Jr., pp. 179-191.

A Report of a Reconnaissance of a Part of the Breckinridge Cannel Coal District. By Norwood, Charles J., pp. 193-218.

1885.

PETER, ROBERT, and PETER, ALFRED MEREDITH.

Chemical Analyses. A. Vol. II (Vol. A, Part II). Fourth, Fifth and Sixth Chemical Reports, and Comparative Views of the Compositions of Soil, Coal, Ores, Limestones, Clays, Marls, Mineral Waters, etc., etc. 194 pages. Indexed. This volume is composed of reprinted chemical reports of the Shaler and Proctor Surveys. Electrotyped for the Survey by John D. Woods, Public Printer and Binder, Frankfort, Ky. 1885. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

(Contents as follows:)

(The following 2 titles are reprints from the Shaler and Procter Surveys.)

Chemical Report of the Soils, Coals, Ores, Clays, Marls, Mineral Waters, Rocks, etc., of Kentucky. By Peter, Robert, pp. 1-9B. Part XIII, Vol. V, 2d Series. 1879.

Comparative Views of the Composition of the Soils, Limestones, Clays, Marls, etc., etc., of the Several Geological Formations of Kentucky, as Shown by the Chemical Analyses published in the several Reports of the Geological Survey of the State, with Remarks on their Character and Practical Uses. By Robert Peter, pp. 95-174. April, 1883.

1885.

CRANDALL, A. R.

Report on the Pound Gap Region. 29 pp., 8 photographic illustrations, 2 loose maps. Published as a paper bound pamphlet. Stereotyped by John D. Woods, Public Printer and Binder, Frankfort, Ky. Dated June 15, 1885. Reprinted in Ann. Report State Inspector of Mines 1901-02, Norwood, following p. 436, pp. 1-29. (Ky. Geol Surv. Lib., Frankfort. Rare.)

HODGE, JAMES M.

Preliminary Report on the Geology of Parts of Letcher, Harlan, Leslie, Perry and Breathitt Counties, pp. 33-52a. Ten coal and geologic section plates. Published as a paper bound pamphlet. Stereotyped for the Survey by John D. Woods, Public Printer and Binder, Frankfort, Ky. Dated March 12, 1885. Reprinted in Ann. Report State Inspector of Mines 1901-02, Norwood, following p. 436, pp. 35-52a. (Ky. Geol. Surv. Lib., Frankfort. Rare.)

HODGE, JAMES M.

Preliminary Report on the Geology of the Lower North Fork, Middle and South Forks (of the) Kentucky River, pp. 54-114. Twenty-two coal and geologic section plates. Published as a paper bound pamphlet with the preceding report. Stereotyped for the Survey by John D. Woods, Public Printer and Binder, Frankfort, Ky. (1885?) Reprinted in Ann. Report State Inspector of Mines, 1901-02, Norwood, following p. 436, pp. 57-114, with plates I-XXX. (Ky. Geol. Surv. Lib., Frankfort. Rare.)

1885.

KNOTT, W. T.

Report on the Geology of Marion County, 43 pp., 1 appendix A, 1 geologic diagram, 1 geologic map (colored) of Washington and Marion Counties. Scale: 1 inch=2 miles. Paper pamphlet. John D. Woods, Public Printer and Binder. Dated Jan. 1, 1885. (Louisville and Lexington Pub. Libs., State Lib., Frankfort. Rare.)

BECKHAM, CHARLES WICKLIFFE.

List of Birds of Nelson County, 58 pp. Paper pamphlet. Electrotyped for the Survey by John D. Woods, Public Printer and Binder, Frankfort, Ky. Dated March 25, 1885. (Ky. Geol. Surv. Lib., Frankfort. Rare.)

LINNEY, W. M.

Report of the Geology of Mason County, 31 pp., 1 geologic (colored) map of Mason County. Scale: 1 inch=2 miles. Paper pamphlet. Stereotyped by John D. Woods, Public Printer and Binder. Dated Dec., 1885. (Louisville and Lexington Pub. Libs., State Lib., Frankfort. Rare.)

DAVIS, WILLIAM J.

Kentucky Fossil Corals. A Monograph of the Fossil Corals of the Silurian and Devonian Rocks of Kentucky. (In Two Parts, Part I not published.) (Part II.) Index 13 pages. 139 full page fossil plates and 139 pages adjoining of descriptive matter. Bound in paper. Electrotyped and printed by John D. Woods, Public Printer, Frankfort, Ky. 1885. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

1886.

PROCTER, JOHN R.

Report on the Progress of the Survey from January, 1884, to January, 1886, pp. 60-79. Capital Office, Frankfort, Kentucky. John D. Woods, Public Printer and Binder. 1886. (Louisville and Lexington Pub. Libs., State Lib., Frankfort. Rare.)

1886.

LINNEY, W. M.

Report on the Geology of Bath County, 56 pp., appendix A and B, 1 geologic (colored) map of Bath and Fleming Counties. Scale: 1 inch=2 miles. Published with the following report on Fleming County, in paper pamphlet. Stereotyped for the Survey by John D. Woods, Public Printer and Binder, Frankfort, Ky. Dated Jan., 1886. (Louisville Pub. Lib., State Lib., Frankfort. Rare.)

Report on the Geology of Fleming County, pp. 57-86, 1 appendix A, 1 geologic (colored) map of Bath and Fleming Counties. Scale: 1 inch=2 miles. Published with the preceding report on Bath County, in paper pamphlet. Stereotyped for the Survey by John D. Woods, Public Printer and Binder, Frankfort, Ky. Jan., 1886. (Louisville Pub. Lib., State Lib., Frankfort. Rare.)

CRANDALL, A. R.

Report on the Geology of Elliott County, 16 pp., 5 photographic illustrations, 3 map and section plates, 1 geologic (colored) map of Elliott County. Scale: 1 inch=2 miles. 1 geologic (colored) map, Boyd, Carter, Elliott, Lawrence, Morgan, Johnson Counties. Scale: 1 inch=4 miles. Paper pamphlet. Stereotyped for the Survey by John D. Woods, Public Printer and Binder, Frankfort, Ky. (Louisville Pub. Lib., Ky. Geol. Surv. Lib., Frankfort. Rare.)
Notes on the Elliott County Dike, Eastern Kentucky, pp. 17-18-19. Published with, Report on the Geology of Elliott County. (Louisville Pub. Lib., Ky. Geol. Surv. Lib., Frankfort. Rare.)

DILLER, J. S.

Notes on the Peridotite of Elliott County, Kentucky, pp. 20-25. Reprint from the Amer. Journ. Sc., Aug., 1886. Published with, Report on the Geology of Elliott County. (Louisville Pub. Lib., Ky. Geol. Surv. Lib., Frankfort. Rare.)

The Genesis of the Diamond, pp. 25-28. Reprint from Science. Oct. 29, 1886. Published with, Report on the Geology of Elliott County. (Louisville Pub. Lib., Ky. Geol. Surv. Lib., Frankfort. Rare.)

1887.

PROCTER, JOHN R.

Report on the Progress of the Survey for the years 1886 and 1887, pp. 80-107. Capital Office, Frankfort, Kentucky. John D. Woods, Public Printer and Binder, 1887. (Louisville and Lexington Pub. Libs., State Lib., Frankfort. Rare.)

1887.

LINNEY, W. M.

Report on the Geology of Henry County, 19 pp., 1 appendix A, 1 geologic (colored) map of Henry, Shelby and Oldham Counties. Scale: 1 inch=2 miles. Published as paper pamphlet with the succeeding reports on Shelby and Oldham Counties. Stereotyped for the Survey by John D. Woods, Public Printer and Binder. Dated Jan., 1887. (Louisville and Lexington Pub. Libs., State Lib., Frankfort. Rare.)

Report on the Geology of Shelby County, 17 pp., 1 appendix A, 1 geologic (colored) map of Henry, Shelby and Oldham Counties. Scale: 1 inch=2 miles. Published as paper pamphlet with the preceding report on Henry, and the succeeding report on Oldham, Counties. Stereotyped for the Survey by John D. Woods, Public Printer and Binder. Jan., 1887. (Louisville and Lexington Pub. Libs., State Lib., Frankfort. Rare.)

Report on the Geology of Oldham County, 35 pp., 1 appendix, 1 geologic (colored) map of Henry, Shelby and Oldham Counties. Scale: 1 inch=2 miles. Published as a paper pamphlet. Stereotyped for the Survey by John D. Woods, Public Printer and Binder. Jan., 1887. (Louisville and Lexington Pub. Libs., State Lib., Frankfort. Rare.)

PROCTER, JOHN R.

Cumberland Gap, its Geographical and Commercial Features and Importance as a Railroad Center. 1887. (State Lib., Frankfort. Rare.)

1888.

LOUGHRIDGE, R. H.

Report on the Geological and Economic Features of the Jackson Purchase Region, embracing the Counties of Ballard, Calloway, Fulton, Graves, Hickman, McCracken, and Marshall. 21 plates, geologic and miscl. diagrams, 3 maps, pp. 1-357. Indexed. Stereotyped for the Survey by John D. Woods, Public Printer and Binder, Frankfort, Ky. 1888. (Louisville and Lexington Pub. Libs., State Lib., Frankfort. Rare.)

PETER, ROBERT, and PETER, ALFRED M.

(The Seventh) Chemical Report of the Coals, Soils, Clays, Petroleum, Mineral Waters, &c., of Kentucky. 171 pp. Indexed. Stereotyped for the Survey by John D. Woods, Public Printer, Frankfort, Ky. 1888. (Louisville and Lexington Pub. Lib., State Lib., Frankfort. Rare.)

(1889?)

CRANDALL, A. R.

Report on the Geology of Whitley County, and a part of Pulaski. 44 pp. 10 full page photographs, 1 geologic (colored) map of Whitley and parts of Pulaski, Laurel and Bell Counties. Scale: 1 inch=2 miles. Dated 1889. Published as paper bound pamphlet. Stereotyped for the Survey by E. Polk Johnson, Public Printer, Frankfort. 1889. (Louisville and Lexington Pub. Libs., State Lib., Frankfort. Rare.)

1889.

NETTLEROTH, HENRY C. E.

Kentucky Fossil Shells. A Monograph of the Fossil Shell of the Silurian and Devonian Rocks of Kentucky. Part I, pp. 1-245, 36 plates. Electrotyped and printed by E. Polk Johnson, Public Printer and Binder, 1889. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

(Contents as follows:)

Fossil Shells of the Silurian and Devonian Rocks. A Short Sketch on Geology. (Part I), pp. 3-27.

Fossil Shells of the Silurian and Devonian Rocks. Description of Species. (Part II), pp. 27-230, 36 full-page plates of fossils.

1890.

PROCTER, JOHN R.

Report on the Progress of the Survey from January, 1888, to January, 1890, pp. 108-120. Printed at Capital Office, Frankfort, Kentucky. E. Polk Johnson, Public Printer and Binder. 1890. (Louisville and Lexington Pub. Libs., State Lib., Frankfort. Rare.)

CRANDALL, A. R.

Illustrated Description of the Log Mountain, Clear Creek, Region, in Bell County, Kentucky, 1890. (Louisville and Lexington Pub. Libs., State Lib., Frankfort. Rare.)

LOUGHRIDGE, R. H.

Report on the Geology of Clinton County, 48 pp., 1 geologic (colored) map. Paper pamphlet. Stereotyped for the Survey by E. Polk Johnson, Public Printer and Binder, Frankfort, Ky. Dated Feb., 1890. (Louisville Pub. Lib., Ky. Geol. Surv. Lib., Frankfort. Rare.)

1890.

PETER, ROBERT; TALBUTT, JOHN H., and PETER, A. M.

Chemical Analyses. A (Vol. A, Part I), First, Second and Third Chemical Reports, and Chemical Analyses of the Hemp and Buckwheat Plants. Part I, 477 pp. Indexed. This volume is a compiled reprint of the early chemical reports of the Shaler Survey, and a second reprint of the first reprint which was published in 1884. (See 1884.) Stereotyped for the Survey by E. Polk Johnson, Public Printer, 1890. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

(Contents as follows:)

(The following 4 titles are reprints of the Shaler and Procter Surveys.)

Chemical Report of the Soils, Marls, Clays, Ores, Coals, Iron Furnace Products, Mineral Waters, etc., etc., of Kentucky, by Peter, Robert and Talbutt, John H., pp. 1-180. 1875.

Chemical Report of the Soils, Coals, Ores, Iron Furnace Products, Clays, Marls, Mineral Waters, Rocks, etc., of Kentucky, by Peter, Robert, and Talbutt, John H., pp. 181-345. 1887.

Chemical Report of the Soils, Coals, Ores, Iron Furnace Products, Clays, Marls, Mineral Waters, Rocks, etc., of Kentucky, by Peter, Robert, pp. 347-438. 1878.

Chemical Examination of the Ashes of the Hemp and Buckwheat Plants, with Remarks on its Bearing on Hemp Culture in Kentucky, by Peter, Robert; pp. 439-463.

(1890?)

PETER, ROBERT, and PETER, A. M.

Chemical Analyses. Vol. A, Part III. 240 pp. Indexed. A compilation of two reports; the first one is a reprint of 1888, and the second one is new, dated 1890. Published in black linen. Stereotyped for the Survey by John D. Woods, Public Printer, Frankfort, Ky. 1890. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

(The following 2 titles are reprints of the Procter Survey.)

(The Seventh) Chemical Report of the Coals, Soils, Clays, Petroleum, Mineral Waters, etc., of Kentucky. By Peter, Robert, and Peter, Alfred M. 157 pp. (Reprint.)

(The Eighth) Chemical Report of the Coals, Cokes, Mineral Waters, Iron Ores, Limestones, etc., of Kentucky. By Peter, Robert. pp. 159-223. (New.) Dated Jan. 22, 1890.

1891.

ORTON, EDWARD.

Report on the Occurrence of Petroleum, Natural Gas, and Asphalt Rock in Western Kentucky, based on examinations made in 1888 and 1889. 233 pp. Indexed. 2 maps, 3 geologic sections, 3 illustrations. Printed for the Survey by E. Polk Johnson, Public Printer and Binder, Frankfort, Ky. Dated April 2, 1891. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

1891.

SULLIVAN, GEORGE M.

Report on the Geology of Parts of Jackson and Rockcastle Counties. 20 pp. 1 geologic (colored) map of parts of Jackson and Rockcastle Counties. Scale: 1 inch=2 miles. Paper pamphlet. Printed for the Survey by E. Polk Johnson, Public Printer and Binder, Frankfort, Ky. Dated July 11, 1891. (Louisville Pub. Lib., Ky. Geol. Surv. Lib., Frankfort. Rare.)

1892.

PROCTER, JOHN R.

Report on the Progress of the Survey from January, 1890, to January, 1892. 26 pp. 2 Ky. maps in colors, 1 plate. Paper bound pamphlet. E. Polk Johnson, Public Printer. (Ky. Geol. Surv. Lib., Frankfort. Rare.)

KENTUCKY GEOLOGICAL SURVEY.

SERIES III.

CHARLES JOSEPH NORWOOD. Director.

(1904-1912.)

1905.

NORWOOD, CHARLES J.

Report on the Progress of the Survey for the Years 1904 and 1905, pp. 1-56. December 1, 1905. Printed by the Geo. G. Fetter Company, Louisville, Ky. 1905. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

HOEING, JOSEPH B.

The Oil and Gas Sands of Kentucky. Bulletin No. 1. 10 photographs, 3 maps, pp. 1-233. Indexed. October, 1904. Printed by Geo. G. Fetter Co., Louisville, Ky. 1905. (Louisville and Lexington Pub. Libs., State Lib., Frankfort. Rare.)

MILLER, A. M.

The Lead and Zinc Bearing Rocks of Central Kentucky. Bulletin No. 2, pp. 1-35, 12 photographs, 1 map. Dec. 6, 1904. Printed by Geo. G. Fetter Co., Louisville, Ky. 1905. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

PETER, ROBERT.

Chemical Report of the Coals, Clays, Mineral Waters, etc., of Kentucky. Bulletin No. 3, pp. 1-77. Indexed. May 1, 1905. Printed by Geo. G. Fetter Co., Louisville, Ky., 1905. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.).

CRANDALL, ALBERT R.

The Coals of the Big Sandy Valley. Bulletin No. 4, pp. 1-136. Indexed. 1 map, plates A and B. Plate No. 1. 25 sections. October 1, 1905. Printed by Geo. G. Fetter Co., Louisville, Kentucky, 1905. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

NICKLES, JOHN M.

The Upper Ordovician Rocks of Kentucky and their Bryozoa. Bulletin No. 5, pp. 1-64. Indexed. 3 plates. October 31, 1905. Printed by Geo. G. Fetter Company, Louisville, Kentucky, 1905. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

GARDNER, JAMES H., and FOERSTE, AUGUST F.

Clays in Several Parts of Kentucky, with Some Account of Sands, Marls, and Limestones. Bulletin No. 6, pp. 1-223, 6 plates. Indexed. October 1, 1905. Printed by the Geo. G. Fetter Co., Louisville, Kentucky, 1905. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

1906.

FOERSTE, A. F.

The Silurian, Devonian and Irvine Formations of East Central Kentucky. Bulletin No. 7, pp. 1-369. Indexed. Plates (A) to (H) inclusive, 7 maps, 1 diagram, 8 fossil plates. Nov. 1, 1905. Printed by the Geo. G. Fetter Company, 1906. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

(Bulletin No. 8, though written, was never published.)

1907.

FOHS, F. JULIUS.

Fluorspar Deposits of Kentucky. Bulletin No. 9, pp. 1-296. Indexed. List of Mines, Mills and Operators Western Kentucky, pp. 212-239. 23 photographs, 1 sketch map, 1 diagram. March 25, 1907. Printed by Globe Printing Co., Louisville, Kentucky, 1907. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

1908

NORWOOD, CHARLES J.

Progress of the Survey for the years 1906 and 1907, Report on the; pp. 88. Lexington. 1908.

1910.

NORWOOD, CHARLES J., and others.

Report on the Progress of the Survey for the years 1908 and 1909, pp. 1-127, contains the following: (1) Jones, S. C., *Abstract from Preliminary Report of the Soil Survey*, pp. 22-35; (2) Crandall, A. R., *Report on the Coal Beds of the Tug Fork Region; Martin and Pike Counties, Kentucky*, pp. 36-54; (3) Hutchinson, F. M., *Coals in Central City, Madisonville, Calhoun and Newberg Quadrangles of the Western Coal Field*, pp. 54-69; (4) Foerste, August F., *Oil, Gas and Asphalt Rocks in Meade and Breckinridge Counties*, pp. 69-85; (5) Hutchinson, F. M., *Preliminary Report on Oil and Gas Possibilities in the Newberg, Calhoun, Central City and Madisonville Quadrangles, Including a Discussion of the Primary Factors Governing Such Accumulations*, pp. 85-92; (6) Munn, M. J., *Oil and Gas Fields of Eastern and South Central Kentucky*, pp 92-94; (7) Fohs, F. Julius, *The Barytes and Associated Deposits of Central Kentucky*, pp. 94-99; (8) Fohs, F. Julius, *Resources of Lewis and Rowan Counties*, pp. 99-101; (9) Quickel, R. D., *Analyses and Heat Value of Coals*, pp. 99-101; (10) Norwood, C. J., *Co-operation in Mapping*, pp. 126-127. Indexed. January 31, 1910. Printed by the Continental Printing Company, 1910. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

CRANDALL, ALBERT R.

Coals of the Licking Valley Region and of Some of the Contiguous Territory, including also an Account of Elliott County and its Dikes. Bullettin No. 10, pp. 1-90. Indexed. Plates (A) and (B), 8 plates, 1 general section, 1 profile section, 1 map, Caney Creek, Morgan County, 1 map of the Licking Valley Region. Manuscript completed September 1, 1907. Printed by the Continental Printing Company, Louisville, Kentucky, 1910. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

HODGE, JAMES M.

Report on the Coals of the Three Forks of the Kentucky River. Bulletin No. 11, 6 maps, 1 photograph, 76 sections, 1 revised preliminary map, Southeastern Kentucky, pp. 1-280. Indexed. Manuscript completed November, 1907. Printed by the Continental Printing Company, Louisville, Kentucky, 1910. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

MILLER, A. M.

Coals of the Lower Measures along the Western Border of the Eastern Coal Field. Bulletin No. 12, pp. 1-83 (3 geological quadrangular maps included), 38 analyses, plates (A), (B), (C), (D). Indexed. Printed by Continental Printing Company, Louisville, Kentucky, 1910. (Louisville and Lexington Pub. Libs., State Lib. Frankfort.)

1912.

HODGE, JAMES M.

The Upper Cumberland Coal Field. The Region Drained by Poor and Clover Forks in Harlan and Letcher Counties. Bulletin No. 13, pp. 1-223. Indexed. (1 geographic map included.) 72 sections, 5 photographs, 1 sketch map of Fugitt Creek, 1 sketch map of Child's Creek, 81 analyses. Manuscript completed, 1907; revision completed in 1910; sent to printer July 31, 1911. Printed by the Interstate Publishing Company, 1912. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

CRANDALL, ALBERT R., and SULLIVAN, GEO M.

Report on the Coal Field Adjacent to Pineville Gap in Bell and Knox Counties. Bulletin No. 14, pp. 1-130. Indexed. (1 geographic map included), 15-page maps 47 analyses. Manuscript completed, 1907, lost, rewritten in 1910. Printed by the Interstate Publishing Company, 1912. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

NORWOOD, CHARLES J.

Report on the Progress of the Survey for the Years 1910 and 1911. Includes 1 index map of topographic surveys in Kentucky. Pp. 1-38. January, 1912. (Ky. Geol. Surv. Lib., State Lib., Frankfort.)

(Bulletin No. 15, though written, was never published.)

MORSE, WILLIAM CLIFFORD, and FOERSTE, AUGUST F.

Preliminary Report on the Waverlain Formations of East Central Kentucky, and Their Economic Values. Bulletin No. 16, pp. 1-76, 5 photographs. Indexed. Manuscript completed July 27, 1909. Printed by the Interstate Publishing Co., 1912. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

GLENN, LEONIDAS C.

A Geological Reconnaissance of the Tradewater River Region with Special Reference to the Coal Beds, Embracing Parts of Union, Webster, Hopkins, Crittenden, Caldwell and Christian Counties. Bulletin No. 17 (Serial No. 24), pp. 1-75, 1 section included. Manuscript completed, 1910. Indexed. Table of Analyses. Printed by the Interstate Publishing Co., 1912. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

FOHS, F. JULIUS.

Coals of the Region Drained by the Quicksand Creeks in Breathitt, Floyd and Knott Counties. Bulletin No. 18, pp. 1-79. Indexed. No. 1 map (Drainage Region of the Quicksands). No. 2 map (Smith Branch Map). No. 3 map (Upper South Quicksand Map). No. 4 map (Press Howard Creek Map). No. 5 map (Hunting

Creek Map). No. 6 map (Little Caney Creek Map). No. 7 map (Spring Fork Map). No. 8 map (Laurel Fork Map). Manuscript completed 1910. Printed by the Interstate Publishing Co., 1912. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

HUTCHINSON, F. M.

Report on the Geology and Coals of the Central City, Madisonville, Calhoun and Newberg Quadrangles in Muhlenberg, Hopkins, Ohio, McLean, Webster, Daviess and Henderson Counties. Bulletin No. 19 (Serial No. 26). Manuscript completed in 1911, pp. 1-127. Sections and 4 geological quadrangle maps included. Printed in 1912. [A fraudulant issue of this report was published by the State Printer giving credit for authorship to F. Julius Fohs. An incomplete issue of it with 126 pages only, no maps, etc., was also issued above Hutchinson's name as Bulletin No. 22.] (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

GARDNER, JAMES H.

Preliminary Report on the Economic Geology of the Hartford Quadrangle, pp. 1-25 of Bul. 20, Serial 27, of Series III, which also contains the following title:

JONES, S. C.

The Soils of the Same Quadrangle, Bulletin No. 20 (Serial No. 27), pp. 1-33. Indexed. 4 plates. Manuscript completed 1911. Printed by the Interstate Printing Co., Louisville, Kentucky, 1912. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

FOERSTE, AUGUST F.

Report on the Value of the Dix River as a Source of Water Power, Bulletin No. 21 (Serial No. 28), pp. 1-63. Indexed. Plates (A), (B), (C) and (D). Field work done in 1910-11. Printed by Interstate Publishing Co., 1912. [Supplementary Report on Dix River by August F. Foerste in pamphlet form included in this report.] (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

FOHS, F. JULIUS.

Report on the Economic Geology of Lewis and Rowan Counties. County Report No. 3, pp. 1-62. Indexed. 2 photographs. (Field work for this report was done in 1909, and report made ready for the printer in the latter part of April, 1910.) Printed 1912. (Ky. Geol. Surv. Lib., Frankfort. Rare.)

Report on the Geology and Economic Resources of Rockcastle County. County Report No. 4, pp. 1-112. Indexed. Field work on this report was done during the Summer of 1910. Printed 1912. (Ky. Geol. Surv. Lib., Frankfort. Rare.)

KENTUCKY GEOLOGICAL SURVEY.

JOSEPH BERNARD HOEING,
State Geologist.

(July 1, 1912-June 30, 1918.)

SERIES IV.

1913.

VOLUME I, PART I.

HOEING, JOSEPH BERNARD, and others.

First Annual Report of the (Kentucky) Geological Survey, Series IV, Vol. I, Part I. 588 pp. No index. Printed by the State Journal Company, Printer to the Commonwealth, Frankfort, Ky., 1913. (Louisville, Lexington and Paducah Pub. Libs., State Lib., Frankfort.)

(Contents as follows:)

HOEING, JOSEPH B.

Preface. Pp. 1-20.

Oil and Gas. 36 Well Records. Pp. 21-61.

Barite, Fluorspar, Zinc and Lead, Central Kentucky. List of Firms in Kentucky Selling Ground Limestone. Pp. 62-66.

Water Power. 1 photograph. Pp. 67-78.

The Coals of the Upper Big Sandy Valley and the Headwaters of the North Fork of the Kentucky; pp. 79-261.

CRIDER, A. F.

Economic Geology of Tell City and Owensboro Quadrangles. Table of Contents 262. 8 photographs. 1 section. pp. 262-316.

MILLER, ARTHUR McQUISTON.

Geology of the Georgetown Quadrangle. Pp. 317-364, 1 section, 4 faults, 1 profile section, 10 plates. Map of Georgetown Quadrangle, 1917, included.

FOERSTE, A. F.

The Identification of Trenton and Lower Geological Horizons, pp. 365-376.

A Chemical Study of the Trenton and Stone's River Rocks in Central Kentucky, pp. 377-385.

FOERSTE, A. F.

The Phosphate Deposits in the Upper Trenton Limestones of Central Kentucky; pp. 391-440, 2 photographs, 1 map.

FOHS, F. JULIUS.

Barytes Deposits of Kentucky; pp. 441-588, 2 maps, 1 cross-section, 9 plates.

VOLUME I, PART II.

HOEING, JOSEPH B., and others.

First Annual Report of the (Kentucky) Geological Survey, Series IV, Vol. I, Part II; pp. 1216. No index. Printed by the State Journal Company, Printer to the Commonwealth, Frankfort, Kentucky.

(Contents as follows:)

CRIDER, A. F.

The Fire Clays and Fire Clay Industries of the Olive Hill and Ashland Districts of Northeastern Kentucky; pp. 589-712, 6 sections, 6 photographs.

EASTON, H. D.

Report on the Technology of Kentucky Clays, Including Chemical and Mechanical Analyses, and Burning Tests; pp. 713-888.

HODGE, JAMES M.

Report on the Coals of the Headwaters of Licking River, Magoffin County; pp. 889-922. (Part II.)

Coals of the North Side of the North Fork of Kentucky River in Perry and Knott Counties; pp. 923-986.

The Coals of the Upper Carr Fork and Big Branch and Bull Creek Region of North Fork of Kentucky River; pp. 987-1036.

CRUMP, MALCOLM H.

The Oolitic Limestones of Warren County; pp. 1037-1052.
Kentucky Rock Asphalt; pp. 1053-1066.

JONES, S. C.

Soil Surveys. Soils of the Eastern Coal Field; pp. 1067-1078.

Soil Survey of Webster County; pp. 1079-1108.

Soil Survey of the Marrs Farm, Henderson County; pp. 1109-1118.

Soil Surveys of the Hartford, Madisonville and Central City Quadrangles. (A soil Survey of the Hartford Quadrangle.) Pp. 1119-1132.

A Practical Way to Supply Plant Food to our Soils; pp. 1133-1138.
Soils of Meade and Breckinridge; pp. 1139-1156.

BLAUVELT, WILLIAM HUTTON.

The Manufacture of Coke; pp. 1159-1176. (Reprinted from the Bulletin of the American Institute of Mining Engineers by special permission.) (Bulletin No. 71.)

LUCAS, F. E.

The Manufacture of Coke; pp. 1177-1187. (Reprinted from the Bulletins of the American Institute of Mining Engineers by special permission. Bulletin No. 71.)

HOEING, JOSEPH B.

Elevations above sea of Points in Kentucky. (Compiled from co-operative work of the Kentucky Geological Survey and United States Geological Survey and From the Various Railroad and River Surveys.) Pp. 1188-1211.

List of Astronomical Stations in Kentucky; pp. 1213-1216.

SELLIER, LUCIEN M.

Map of Upper Licking Valley, 1913.
Map of Boyd, Carter and Greenup Counties, 1913.
Sketch Map (Portion of Rowan County), 1913.
Map of Pond and Blackberry Creeks, 1913.
Map of Georgetown Quadrangle, 1913.
Map of Upper Big Sandy Valley (Sheet 1), 1913.
Map of Upper Big Sandy Valley (Sheet 2), 1913.
Map of Upper Big Sandy Valley (Sheet 3), 1913.
Map of Upper Big Sandy Valley (Sheet 4), 1913.

SELLIER, L. M., and others.

Map Packet (Red Cloth), dated 1913. Contains 9 maps and paper bound pamphlet (10 pp.), giving location of Bench Marks shown on maps of Upper Big Sandy Valley; maps as follows: (1) Coal Mine Map of Upper Licking Valley, scale 1 inch=1 mile, black and white, 1913; (2) Map of Boyd, Carter and Greenup Counties, scale 1 inch=1 mile, black and white, 1913; (3) Sketch Map of a Portion of Rowan County, scale 1 inch=1 mile, black and white, 1913; (4) Geological Map of Georgetown Quadrangle, Sellier, L. M., and Miller, A. M., scale 1 inch=1 mile, colored, 1913; (5, 6, 7, 8) Maps of the Upper Big Sandy Valley, blue and white, scale 1 inch=1 mile, 1913; (9) Map of Pond and Blackberry Creeks (Pike County), black and white, scale, 1 inch=1 mile, 1913. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

VOLUME II, PART I.

1914.

HOEING, JOSEPH B., and others.

Second Annual Report of the (Kentucky) Geological Survey, Series IV, Vol. II, 414 pp. No index. Printed by the State Journal Company, Printer to the Commonwealth, Frankfort, Ky. Printers' imprint lacking. March 12, 1914. (Louisville, Lexington and Paducah Pub. Libs., State Lib., Frankfort.)

(Contents as follows:)

CRIDER, A. F.

Report on the Geology and Mineral Resources of the Dawson Springs Quadrangle; pp. 13-68, 5 sections. March 12, 1914.

Geology and Economic Products of the Earlington Quadrangle; pp. 69-154, 31 Well Logs, 2 photographs. February 1, 1914.

BRYANT, J. OWEN.

The Economic Geology of a Portion of Edmonson and Grayson Counties; pp. 151-218, 1 photograph.

HOEING, JOSEPH B.; and BUREAU OF MINES.

Analyses of Coals in Western Coal Fields; pp. 219-414.

SELLIER, LUCIEN M.

Map Showing Geology of the Earlington Quadrangle, 1914.

Map Showing Geology of the Dawson Springs Quadrangle, 1914.

Map of Nolin River District, 1914.

Six (section) plates included in Map Packet.

VOLUME II, PART II.

HOEING, JOSEPH B., and others.

Second Annual Report of the (Kentucky) Geological Survey, Series IV, Vol. II, pp. 360. No general index. Printed by the State Journal Company, Printers to the Commonwealth, Frankfort, Kentucky. 1914. (Louisville, Lexington and Paducah Pub. Lib., State Lib., Frankfort.)

(Contents as follows:)

HODGE, JAMES M.

Report on the Coals of Macies and Leatherwood Creeks, Perry County, Ky.; pp. 1-67; 1914.

HODGE, JAMES M.

Report on the Coals of Goose Creek and its Tributaries in Clay and Knox Counties, Kentucky; pp. 73-146; 1914.

Report on the Coals of the North Fork of Kentucky River from Hazard down to Krypton; pp. 147-198; 1914.

MARSHALL, R. B. (Chief Geographer.)

Results of Spirit Leveling in Kentucky for the Years 1898 to 1913, inclusive. Co-operative work between the U. S. Geological Survey and the Kentucky Geological Survey for the year 1902 to 1913, and work of the U. S. Geological Survey for the years preceding 1902. (From Bulletin 554, U. S. Geological Survey.) Pp. 199-354.

SELLIER, LUCIEN M.

(Map Packet.)

Map of Leatherwood Creek, Perry County, 1914.

Map of Leatherwood Creek, 1914.

Map of Macies Creek, Perry County, 1914.

Map of North Fork Kentucky River and its Tributaries, 1915.

Map of Drainage of North Fork of Kentucky River, Between Hazard and Krypton, 1915.

VOLUME II, PART III.

HOEING, JOSEPH B., and others.

Second Annual Report of the (Kentucky) Geological Survey, Series IV, Vol. II, pp. 144. Printed by the State Journal Company, Printer to the Commonwealth, Frankfort, Kentucky. 1914. (Louisville, Lexington and Paducah Pub. Libs., State Lib., Frankfort.)

(Contents as follows:)

MILLER, A. M.

Geology of Franklin County; pp. 1-87, 1 geological section. 1914.

JONES, S. C.

The Soils of Franklin County; pp. 88-144. 1914.

1915.

VOLUME III, PART I.

HOEING, JOSEPH B., and others.

Third Annual Report of the (Kentucky) Geological Survey, Series IV, Vol. III,, pp. 182. Map Packet included (see Nelson). Printed by the State Journal Company, Printer to the Commonwealth, Frankfort, Ky. 1914. (Louisville, Lexington and Paducah Pub. Libs., State Lib., Frankfort.)

(Contents as follows:)

CRIDER, A. F.

Coals of the Nortonville Quadrangle; pp. 1-64, 3 sections, 1914.

The Coals of the Drakesboro Quadrangle; pp. 65-111. 1914.

Coals of the Dunmor Quadrangle; pp. 112-153. 1914.

The Coals of the Little Muddy Quadrangle; pp. 134-182. 1914.

SELLIER, LUCIEN M.

(Map Packet.)

Map Showing Geology of the Nortonville Quadrangle, 1915.

Map Showing Geology of the Little Muddy Quadrangle, 1915.

Map Showing Geology of the Drakesboro Quadrangle, 1915.

Map Showing Geology of the Dunmor Quadrangle, 1915.

VOLUME III, PART II.

BUTTS, CHARLES.

Geology and Mineral Resources of Jefferson County, Kentucky; pp. 1-270, 2 maps, 1 section, 65 plates. Kentucky Geological Survey and U. S. Geological Survey co-operating. Printed by the State Journal Company, Printer to the Commonwealth, Frankfort, Kentucky. 1915. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

VOLUME III, PART III.

HODGE, JAMES M.

Coals of the North Fork of Kentucky River in Breathitt and Perry Counties; pp. 1-409. (Map of Troublesome Creek and its Tributaries. L. M. Sellier, 1915.) Printed by the State Journal Company, Printer to the Commonwealth, Frankfort, Kentucky. 1915. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

VOLUME IV, PART I.

CRIDER, A. F., and HOEING, JOSEPH B.

Coals of Letcher County; pp. 1-234. (Preface by Hoeing, Joseph B., only.) 2 plates, 1 cross section. (Map Packet containing two maps of Letcher County. Map by L. M. Sellier. Geology by A. F. Crider. 1915.) Printed by the State Journal Company, Printers and Binders, Frankfort, Kentucky. 1915. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

(Miscl. Rept. Unmarked.)

PHALEN, W. C.

The Central Kentucky Phosphate Field; pp. 1-80, 24 plates. Printed by the State Journal Company, Printer to the Commonwealth, Frankfort, Kentucky. 1915. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

(Miscl. Rept. Unmarked.)

HOEING, JOSEPH B.

Report of Progress 1915 (Kentucky Geological Survey). 5 pp., 1 map of Ky. Dec. 7, 1915. Printed by the State Journal Company, Printer to the Commonwealth. 1915. (State Lib., and Ky. Geol. Survey, Lib., Frankfort.)

1916.

VOLUME IV, PART II.

LEE, WALLACE.

Geology of the Shawneetown Quadrangle; pp. 1-73. Separate Tables, No. 1, Table of Water Well Data of Kentucky Portion of Shawneetown Quadrangle. No. 2, Table showing names applied to Coals, etc. See p. 58. No. 3, Average Proximate Analyses by District. No. 4, Proximate Analyses of Face Samples of Coals in

Kentucky Part of Shawneetown Quadrangle. 1 Map of Shawneetown Quadrangle in Kentucky Geology by Wallace Lee. 1916. Printed by the State Journal Company, Printer to the Commonwealth, Frankfort, Ky. 1916. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

(Volume Unmarked.)

HODGE, JAMES M.

Supplementary Report on the Coals of the Clover Fork and Poor Fork in Harlan County. 64 pp., 1 geog. map. Paper bound. Printed by the State Journal Company, Printer to the Commonwealth, Frankfort, Ky. 1916. (Louisville and Lexington Pub. Libs., State Lib., Frankfort. Rare.)

1918.

VOLUME IV, PART III.

HODGE, JAMES M., and RUSSELL, PHILIP G.

The Coals of Clay County, Ky., pp. 1-260. Printed by the State Journal Company, Printer to the Commonwealth, Frankfort, Kentucky. 1918. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

VOLUME V, PART I.

HODGE, JAMES M.

Coals of the Middle Fork of Kentucky River in Leslie and Harlan Counties, pp. 1-166. Printed by the State Journal Company, Printer to the Commonwealth, Frankfort, Kentucky. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

(Volume Unmarked.)

BUTTS, CHAS.

Descriptions and Correlation of the Mississippian Formations of Western Kentucky, pp. 1-119, 32 plates. 1917. Printed by the State Journal Company, Printer to the Commonwealth of Kentucky. 1918. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

ULRICH, E. O.

The Formations of the Chester Series in Western Kentucky and their Correlates Elsewhere, pp. 1-272, 19 plates, 2 maps. 1918. (Louisville and Lexington Pub. Lib., State Lib., Frankfort.)

1919.

VOLUME V, PART II.

BROWNING, ILEY. M., and RUSSELL, PHILIP.

The Coals of Magoffin County, pp. 1-552, 1 section. Separate, one geological and one structural map of Magoffin County. Printed by the State Journal Company, Printers and Binders, Frankfort, Kentucky. 1919. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

DEPARTMENT OF GEOLOGY AND FORESTRY.

JOHN EARLE BARTON,
Commissioner and State Forester.

WILLARD ROUSE JILLSON,
Deputy Commissioner and State Geologist.
(July 1, 1918—March 20, 1920.)

SERIES V.

1919.

JILLSON, WILLARD ROUSE.

The Oil and Gas Resources of Kentucky (Bulletin No. 1). A geological Review of the Past Development and the Present Status of the Industry in Each of the One Hundred and Twenty Counties in the Commonwealth. pp. 1-630. 95 photographs. 1 Index Map and Map packet containing 10 maps and 4 panoramic photographs. Indexed. August 1, 1919. Printed by the State Journal Company, Printers to the Commonwealth, Frankfort, Kentucky. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

MILLER, ARTHUR McQUISTON.

The Geology of Kentucky (Bulletin No. 2). A Classified Compend of State Reports and Other Publications, with Critical Comment Based on Original Investigations. pp. 1-392. Illustrated with 114 Photographs, Maps and Diagrams. Lexington, Kentucky, 1919. Printed by the State Journal Company, Printers to the Commonwealth, Frankfort, Kentucky, 1919. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

JILLSON, WILLARD ROUSE, and HODGE, JAMES M.

The Geology and Coals of Stinking Creek (Knox County, Ky.). Bulletin No. 3, pp. 1-89. Illustrated with 15 Photographs, Maps and Diagrams. Old Capitol, Frankfort, Kentucky, September 1, 1919. Printed by the State Journal Company, Printers to the Commonwealth, Frankfort, Ky. 1919. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

VOLUME I.

(Mineral and Forest Resources Series.)

JILLSON, WILLARD ROUSE; BARTON, JOHN EARLE, and others.

The Mineral and Forest Resources of Kentucky, published quarterly by the Department of Geology and Forestry of the Commonwealth of Kentucky, Frankfort, Ky., pp. 1-396. 61 Photographs, 28 Maps. 6 Plates. Vol. I. Nos. 1 (750 copies), 2 (1500 copies), and 3 (2500 copies) complete the series. Bound in paper cover. Issued, No. 1, April; No. 2, July; No. 3, October, 1919. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

VOLUME I, NO. 1.

JILLSON, WILLARD ROUSE.

Sketch of the Development of the Oil and Gas Industry in Kentucky during the Past Century. (1819-1919.) pp. 3-28. 9 Photographs. 3 Plates.

The Used and Unused Natural Gas Fields of Eastern Kentucky and Their Relations to Present and Future Public Service Demands. pp. 29-36. 1 Plate. 1 Photograph.

A Bibliography of Kentucky Petroleum, Natural Gas, Asphalt, and Oil Shale, pp. 37-43.

VOLUME I, NO. 2.

JILLSON, WILLARD ROUSE.

Structural Deformation and Its Relation to Proven Oil and Gas Accumulation in Eastern Kentucky, pp. 45-57, 5 photographs, 2 maps.

ST. CLAIR, STUART.

The Irvine Oil District, Kentucky, pp. 58-76, 8 photographs, 1 map.

BARTON, JOHN EARLE.

Relation of Private Forestry to the Economic Development of the State, pp. 77-84.

JILLSON, WILLARD ROUSE.

The Status of the Mauch Chunk in Southeastern Kentucky as a Producer of Petroleum and Natural Gas, pp. 85-93, 1 photograph.

Local Name Key to Oil and Gas Pool and Pipe Line Map of Kentucky, pp. 94 and 95. Oil and Gas Pool Pipe Line of Kentucky. June, 1919.

The Kendrick Shale—A New Calcareous Fossil Horizon in the Coal Measures of Eastern Kentucky, pp. 96-104, 2 photographs.

JILLSON, WILLARD ROUSE.

The Migration of the Headwaters Divide of Right Middle Creek, Floyd County, Kentucky, pp. 105-109, 1 map. Reprint from Am.

Jour. Sc., Vol. XLVII, pp. 60-64, Jan., 1919.

MILLER, ARTHUR M.

The Cumberland Falls Meteorite, pp. 110-114, 1 map, 1 photograph.

JILLSON, WILLARD ROUSE.

The Low Sulphur Coals of Kentucky, pp. 115-119, 1 map.

The New Oil and Gas Pools of Allen County, pp. 120-143, 3 photographs, 1 map (small sketch, 1 map (Allen County oil and gas), scale: 1 in.=1 mi.; 1 map (Barren County oil and gas), scale: 1 in.=2 miles.

NORTHROP, JOHN D.

Natural Gas Gasoline in Kentucky in 1917, pp. 144. Reprint from Mineral Resources of the United States, U. S. G. S.

ELLIS, ARTHUR J. (U. S. Geol. Survey).

Kentucky Mineral Waters in 1917, pp. 145. Reprint from Mineral Resources of the United States, U. S. G. S. (Included in Bulletin No. 2.)

VOLUME I, NO. 3.

BUTTS, CHARLES.

Geology of Barren County, pp. 147-178, 6 photographs, 1 plate, 1 map black and white geology of Barren County, scale: 1 inch= 2 miles.

JILLSON, WILLARD ROUSE.

The Oil and Gas Geology of Breathitt and Knott Counties, pp. 178-220, 3 photographs, 3 maps (small); 2 maps (structural in color); scale. 1 mile=1 inch.

MILLER, ARTHUR McQUISTON.

Geology of Allen County, pp. 220-242, 8 photographs, 1 map black and white geology of Allen County, scale: 1 mile=9/10 inch.

RHODES, E. O.

The Paint Creek Uplift, pp. 243-250, 1 structure map (small).

BARTON, JOHN EARLE.

The Amount of Standing Timber in Kentucky, pp. 251-284.

JILLSON, WILLARD ROUSE.

A Bibliography fo the Coals of Kentucky, pp. 285-302.

The Production of Coal in Kentucky, pp. 302-320, 1 map, 1 plate, 8 photographs.

The Wier Sand—A Newly Recognized Oil Horizon in Eastern Kentucky, pp. 321-333, 2 maps.

Pay Oil Sands of Eastern Kentucky, pp. 334-366, 10 maps.

The New Oil and Gas Pools of Warren County, Kentucky, pp. 368-396, 6 photographs, 1 map (oil and gas of Warren County), scale: 1 inch=2 miles.

BARTON, JOHN EARLE.
First Biennial Report of the Department of Geology and Forestry, 25 pp. Printed by the State Journal Company, Printers to the Commonwealth, Frankfort, Ky. 1919.

1920.

JILLSON, WILLARD ROUSE.
Contributions to Kentucky Geology (Bulletin No. 4). 266 pp., 65 photographs and maps. Indexed. 1920. Printed by the State Journal Company, Printers to the Commonwealth, Frankfort, Ky. This book is a compilation of all the reports of the State Geologist previously printed in the Mineral and Forest Resources Series, Vol. I, Nos. 1, 2, and 3, as listed above. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

JILLSON, WILLARD ROUSE, and others.
Map Packet. Contains 8 separate maps. Published by the State Journal Company, Printers to the Commonwealth of Kentucky, Frankfort, Ky. 1920. (Louisville and Lexington Pub. Libs., State Lib., Frankfort.)

JILLSON, WILLARD ROUSE.
Map of the Oil and Gas Pools and Pipe Lines of Kentucky. (Small.)

BUTTS, CHARLES.
Map of the Geology of Barren County. Scale: 1 inch=2 miles.

MILLER, ARTHUR McQUISTON.
Map of the Geology of Allen County. Scale: 1 mile=9/10 inch.

JILLSON, WILLARD ROUSE.
Oil and Gas Map of Warren County. Scale: 1 inch=2 miles.

BROWNING, ILEY B.
Map of the structural geology of Breathitt County. ¾ inch=1 mile.

Map of the structural geology of Knott County. 1 inch=1 mile.

JILLSON, WILLARD ROUSE.
Map of the Kentucky-Appalachian Oil and Gas Fields. (Small.)
Geologic Map of Kentucky. (Small.)

(The following title is a revised reprint.)

JILLSON, WILLARD ROUSE.
The Oil and Gas Resources of Kentucky (Bulletin No. 1, 3rd Edition). A Geological Review of the Past Development and the Present States of the Industry in Each of the One Hundred and Twenty Counties to the Commonwealth, pp. 1-630, 95 photographs, 1 index map and map packet containing 10 maps and 4 panoramic

photographs. Indexed. July 1, 1920. This is marked the second edition, which it is of the Ky. Geol. Surv., official publications. A small private edition of the same work bound in blue cloth and gold was published, however, in 1919. Printed by the State Journal Company, Printers to the Commonwealth, Frankfort, Ky. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

KENTUCKY GEOLOGICAL SURVEY.

SERIES VI.

WILLARD ROUSE JILLSON,
Director and State Geologist.
(April 1, 1920—)

1920.

RICHARDSON, CHARLES HENRY.

The Glass Sands of Kentucky, 149 pp., 23 photographs, map and diagrams. Blue cloth. Ky. Geol. Surv. Series VI, Vol. 1. The State Journal Company, Sept. 10, 1920. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

1921.

JILLSON, WILLARD ROUSE.

Economic Papers on Kentucky Geology, 304 pp., 115 photographs, maps and diagrams. Blue cloth. Ky. Geol. Surv. Series VI, Vol. II. The State Journal Company. March 1, 1921. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

WELLER, STUART.

Geology of the Golconda Quadrangle, 148 pp., 1 plate-map. Blue Cloth. Ky. Geol. Surv. Series VI, Vol. IV. The State Journal Company, June 6, 1921. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

JILLSON, WILLARD ROUSE.

The Sixth Geological Survey, 291 pp., 101 photographs, maps and diagrams. Blue cloth. Ky. Geol. Surv., Series VI, Vol. VI., contains also ten separate papers, as follows: Merrill, George P., II. *The Cumberland Falls, Whitley County, Ky., Meteorite;* Jillson, Willard Rouse, *III. The Geology and Coals of the Middle Fork of the Kentucky River near Buckhorn in Perry and Breathitt Counties, Ky.;* St. Clair Stuart, IV. *Oil Pools of Warren County, Ky.,* Jillson, Willard Rouse, V. *A New Method of Producing Crude Oil in Kentucky;* Crouse, C. S., VI. *Retorting Methods as Applied to*

Kentucky Oil Shales; Jillson, Willard Rouse, VII. *Oil and Gas Possibilities of the Jackson Purchase Region;* Weller, Stuart, VIII. *Oil and Gas Possibilities in Caldwell County, Ky.;* Jillson, Willard Rouse, IX. *Drainage Problems in Kentucky;* Jillson, Willard Rouse, X. *Recent Mineral Production in Kentucky;* Jillson, Willard Rouse, XI. *The Region About Frankfort;* The State Journal Company, Dec. 15, 1921. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libraries, State Lib., Frankfort.)

1922.

Oil Field Stratigraphy of Kentucky, 738 pp., 35 photographs, maps and diagrams. Blue cloth. Ky. Geol. Surv. Series VI, Vol. III. The State Journal Company, Jan. 1, 1922. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

GLENN, LEONIDAS CHALMERS.

The Geology and Coals of Webster County, 249 pp., 32 photographs, maps and diagrams. Blue cloth. Ky. Geol. Surv. Series VI, Vol. V. The State Journal Company, 1922. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

BUTTS, CHARLES.

The Mississippian Series of Eastern Kentucky, 188 pp., 93 photographs, maps and diagrams. Blue cloth. Ky. Geol. Surv. Series VI, Vol. VII. The State Journal Company, 1922. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

RIES, HEINRICH.

The Clay Deposits of Kentucky, 241 pp., 63 photographs, maps and diagrams. Blue cloth. Ky. Geol. Surv. Series VI, Vol. VIII. The State Journal Company, 1922. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

1923.

DAVIS, DARRELL HAUG.

Geography of the Jackson Purchase Region. 185 pp., 100 photographs, maps and diagrams. Blue cloth. Ky. Geol. Surv. Series VI, Vol. IX. The State Journal Company, 1923. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

WELLER, STUART.

Geology of the Princeton Quadrangle. 163 pp., 42 photographs, maps and digarams. Blue cloth. Ky. Geol. Survey, Series VI, Vol. X, contains also four separate papers as follows: Miller, Arthur

McQuiston, *Recent Cave Explorations in Kentucky for Animal and Human Remains;* Burroughs, Wilbur Greeley, *A Pottsville Filled Channel in the Mississippian;* Noe, Adolph Charles, *The Flora of the Western Kentucky Coal Field;* and Jillson, Willard Rouse, *A Bibliography of the Mammoth Cave of Kentucky.* The State Journal Company, 1923. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

RICHARDSON, CHARLES HENRY.

Building Stones of Kentucky, 357 pp., 86 photographs, maps and diagrams. Blue cloth. Ky. Geol. Survey, Series VI, Vol. XI. The State Journal Company, 1923. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

JILLSON, WILLARD ROUSE.

New Oil Pools of Kentucky. 43 photographs, maps and diagrams. Blue cloth. Ky. Geol. Survey, Series VI, Vol. XII. The State Journal Company, 1923. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

CURRIER, LOUIS WADE.

Fluorspar Deposits of Kentucky. 198 pp., 43 photographs, maps and diagrams. Blue cloth. Ky. Geol. Survey, Series VI, Vol. XIII. The State Journal Company, 1923. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

KING, WARREN R.

Surface Waters of Kentucky. With photographs, maps and diagrams. Blue cloth. Ky. Geol. Survey, Series VI, Vol. XIV. The State Journal Company, 1923. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

JILLSON, WILLARD ROUSE.

Geological Research in Kentucky. 224 pp., 8 photographs, maps and diagrams. Blue cloth. Ky. Geol. Survey, Series VI, Vol. XV. The State Journal Company, 1923. (Louisville, Lexington, Paducah, Winchester and Ashland Pub. Libs., State Lib., Frankfort.)

NOTE:—For additional reports and maps available for distribution or in press see page 207.

CHAPTER IV.

BIBLIOGRAPHY OF KENTUCKY GEOLOGY.

(806 Titles)

Based upon all available sources, including the publications of the Kentucky Geological Survey, the U. S. Geological Survey, the U. S. Bureau of Mines, various scientific societies, the state geological surveys, the Congressional Library Catalogue, the published bibliographic works of A. R. Hasse, R. R. Bowker, A. M. Miller, W. R. Jillson, and others.

ALLEN, JOSEPH H.

1. Western Kentucky coals and cokes: Am. Inst. Mining Eng. Trans., vol. 16, pp. 581-593, 1888.

ALLEN, RISDEN T., and BUSHNELL, T. M.

2. Soil survey of Christian County: Field operations of the Bureau of Soils, 1912. Separate, issued 1914.
3. Soil survey of Jessamine County: Field operations of the Bureau of Soils, and issued as a separate, 1916.

ALTHOUSE, H. W.

4. Norton coals of the Big Sandy basin, The: Eng. and Min. Journ., vol. 77, pp. 235-236, 2 figs., 1904.

ANDREWS, E. B.

5. Comparison between the Ohio and West Virginia sides of the Allegheny coal fields, A: Am. Journ. Sci., 3d series, vol. 10, pp. 283, 290, 1875. Am. Asso. Adv. Sci. Proc., Vol. 24 part 2, pp. 84-92, 1875. Reference to Kentucky.
6. On the paralleism of coal seams: Am. Journ. Sci., 3d series, vol. 8, pp. 56-59, 1874. Cin. Quart. Journ. Sci., vol. 1, pp. 340-342, 1874. Reference to Kentucky.
7. Rock oil, its geological relations and distribution. Am. Journ. Sci., 2nd series, vol. 32, pp. 85-93, 1861. Reference to Kentucky.

ANDERSON, F. PAUL.

8. Calorific properties of Kentucky coals: Report of Inspector of Mines for Kentucky, pp. 217-234, 1895.

ARNOLD, RALPH, and DARNELL, J. L., and others.

9. Manual for the Oil and Gas Industry under the Revenue Act of 1918. U. S. Internal Revenue Bureau, also John Wiley and Sons, N. Y. City; pp. 190; 1920. Discusses production curves of Kentucky oil and gas sands.

ASHBURNER, CHARLES A.

10. Coal: U. S. Geol. Surv., Mineral Resources, pp. 474-479, 1888.

ASHLEY, GEORGE HALL.

11. Cumberland Gap coal field of Kentucky and Tennessee: U. S. Geol. Surv., Bulletin No. 225, pp. 259-275, 1904. Mining Mag., vol. 10, pp. 94-100, 1 pl., 5 figs., 1904.
12. Eastern interior coal field: U. S. Geol. Surv., 2nd Annual Report, pt. 3, pp. 265-305, 4 pls., 1 fig., 1902.
13. Geologic structure of the region around Middlesboro, Kentucky: Abstract, Science, new series, vol. 19, p. 856, 1904.
14. Oil resources of black shales of the eastern United States: U. S. Geol. Surv., Bulletin 641, pp. 311-324, Feb. 8, 1917. Reference to black shale of Kentucky.
15. Water resources of the Middlesboro-Harlan region of southeastern Kentucky: U. S. Geol. Surv., Water Supply and Irrigation Paper, No. 110, pp. 177-178, 1905.

    Suggested Correspondence of Coals of the Appalachian Coal Fields, 5 pp. Pub. in The Coal Industry, March, 1922. Suggests a partial correlation of eastern Kentucky coals with most of adjoining states.

ASHLEY, GEORGE HALL, and GLENN, L. C.

16. Resources of a part of the Cumberland Gap coal field of Kentucky: U. S. Geol. Surv., Professional Paper No. 49, 239 pp., 40 pls., 13 figs., 1906.

AUDUBON, JOHN JAMES.

17. An Earthquake in Kentucky, pp. 342-344, with autographed photograph. A fine description of an earthquake disturbance experienced in Barren County, Kentucky, in Nov., 1825. Excerpt from magazine of Am. Hist., Vol. XVI, No. 4., Oct., 1886. Edited by Mrs. Martha J. Lamb, 30 Lafayette Place, N Y. City. Also reprinted in "Audubon and His Journals," by Maria R. Audubon; and with zoological and other notes by Elliott Coues. Illustrated. Vol. II, pp. 234-237, New York, Scribners, 1897. Also See Orinthological Biography, Vol. I, pp. 237-241, Edinburgh, 1831.

AVERITT, SAXE DABNEY.

18. Soils of Kentucky: Kentucky Agr. Exp. Sta., Bulletin No. 193, pp. 129-164, 1915.

AYRS, O. L.

18a. Soil Survey of Madison County. See Griffen, A. M., and Ayrs, O. L.

BACON, RAMOND FOSS, and HAMOR, WILLIAM ALLEN.

19. The American Petroleum Industry. Vol. I, 446 pp. Vol. II, 517 pp. Illustrated. McGraw-Hill Book Co., New York City, 1916. Numerous references to geology of Kentucky petroleum. Sketches somewhat inaccurate and incomplete. Bibliography now out of date.

BAGBY, F. H.

20. The South Central Petroleum District. Annual Report of Inspector of Mines of Kentucky, 1895, pp. 294-299. (Wayne, Cumberland, Clinton and Russell Counties, Ky.)

BAIN, HARRY FOSTER.

21. Early geological surveying in Kentucky: Mining and Sci. Press, vol. 101, pp. 435-437, 14 figs., Oct. 1, 1910.

22. Fluorspar deposits of the Kentucky-Illinois district: grades of the ore, geology of the district, and genesis of the ores: Mines and Minerals, vol. 25, pp. 182-183, 1 fig., 1904.

23. Life of an early geological survey (Second Geological Survay of Kentucky): Mining and Sci. Press, vol. 113, No. 16, pp. 564-566, 5 figs., Oct. 14, 1916.

BARKER, ELIHU (of Philadelphia).

24. Map of the State of Kentucky from actual survey. Pub. June 1, 1795, by J. Debren, Piccadilly, London. T. Conder, Sculpt.

BASSLER, RAY S.

25. Bibliographic index of American Ordovician and Silurian fossils in two volumes: U. S. Nat. Museum, vol. 1, 718 pp., vol. 2, pp. 718-1521, 4 correlation tables, 1915.

BEACHLER, CHARLES S.

26. Keokuk group of the Mississippi Valley: Am. Geol., vol. 10, pp. 88-96, 1892. Reference to Kentucky.

BEECHER, CHARLES E., and SCHUCHERT, CHARLES.

27. Development of the brachial supports in Dielasma and Zygospira: Washington Biol. Soc., Proc., vol. 8, pp. 71-78, 10 pls., 1893. Describes development of loop in Dielasma turgida from Lower Carboniferous of Kentucky.

BENNETT, FRANK.

27(a) Soil Survey of Rockcastle County: See Burke, R. T. Avon.

BERRY, EDWARD WILBER.

28. Lower Eocene floras of southeastern North America: U. S. Geol. Surv., Prof. Paper No. 91, 481 pp., 117 pls., 16 figs., 1916. Abstract, Washington Acad. Sci. Journ., vol. 6, No. 19, pp. 663-664, Nov. 19, 1916.

29. Mississippi Bluffs at Columbus and Hickman, Kentucky, and their fossil flora: U. S. Nat. Mus. Proc., vol. 48, pp. 293-302, 2 pls., 1915.

BLAKE, W. P.

29(a) Geological map of the United States, etc.: See Hitchcock, Charles, and Blake, W. P.

BLAUVELT, W. H.

30. Manufacture of coke: Kentucky Geol. Surv., series 4, vol. 1, part 2, pp. 1159-1187, 1913.

BLENKINSOPP, LAWSON.

31. Annual report of the State Department of Mines of Kentucky for the year ending Dec., 1920. 252 pp. State Dept. of Mines, 1921. Detailed report on production of coal with reference to geology.

BOYD, C. R.

32. Middlesboro: Eng. and Min. Journ., vol. 49, pp. 171-173, 1890.

BRADLEY, FRANK H.

33. Geological chart of the United States east of the Rocky Mountains, and of Canada: 16 by 24 inches, New York, 1875. Includes Kentucky.

34. On a geological chart of the United States east of the Rocky Mountains and of Canada: Am. Journ. Sci., 3d series, vol. 12, pp. 286-291, 1876. Reference to Kentucky.

BREWER, WILLIAM H.

35. Warren's New Physical Geography: pp. 144, Philadelphia, 1890. Reference to Kentucky.

BRINSMADE, ROBERT B.

36. Lead deposits in northern Kentucky: Eng. and Min. Journ., vol. 83, pp. 658-659, 2 figs., April 6, 1907.

BROWN, C. B.

37. A View of the Soil and Climate of the United States of America, etc. J. Conrad & Co., Pub., Philadelphia, 1804. 464 pp., 2 maps. (Transylvania Univ. Lib.) Ky. references to mounds between Cincinnati and Lexington, p. 422.

BROWN, C. NEWTON.

38. Coal and iron of the Big Sandy valley: Part of a report issued from office of the U. S. Engineers on the survey of the Big Sandy Valley, pp. 6, 83 figs. (coal sections, 1900).

BROWNING, ILEY B., and RUSSELL, PHILIP G.

39. The Coals of Magoffin County: Kentucky Geol. Surv., Series IV, Vol. 4, Part 4. (In press.)

BRYANT, J. OWEN.

40. Economic geology of a portion of Edmonson and Grayson Counties: Kentucky Geol. Surv., series 4, vol. 2, part 1, pp. 155-218, 1914.

BRYSON, JOHN.

41. Preglacial channels at the Falls-of-the-Ohio: Am. Geol., vol. 5, pp. 186-188, 1890.

42. Terminal moraine near Louisville, The. Am. Geol., vol. 4, pp. 125-126, 1889.

43. Wetwoods, The: Am. Geol., vol. 6, pp. 254-255, 1890. Reference to a region near Louisville.

BUCHER, WALTER H.

44. Large current ripples as indicators of paleogeography: National Academy of Sci., vol. 3, pp. 285-290, April, 1917. Reprint. Reference to Kentucky.

45. On Oolites and Spherulites. (Reprinted for private circulation from the Journal of Geology, Vol. XXVI, No. 7, October-November, 1918.) Reference to Kentucky.

46. On Ripples and Related Sedimentary Surface Forms and Their Paleographic Interpretation. Part I, March, Part II, April, 1919. (From the Amer. Jour. of Sci., Vol. XLVII, March and April, 1919.) Reference to Kentucky.

BURCHARD, ERNEST F.

47. Glass-sand industry of Indiana, Kentucky and Ohio: U. S. Geol. Surv., Bulletin No. 315, pp. 361-376, 1907.

48. Fluorspar and cryolite: U. S. Geol. Surv., Mineral Resources, part 2, No. 22, 14 pp., 1917.

BURKE, R. T. AVON.

49. Soil survey of Mason County: U. S. Dept. of Agr., 1904.

50. Soil survey of Scott County: Field operations of the Bureau of Soils, U. S. Dept. of Agr., 16 pp., 1903, separate, 1904.

BURKE, R. T. A.; BENNETT, FRANK, and LOUNSBURY, CLARENCE.

51. Soil survey of Rockcastle County: Field operations of the Bureau of Soils, U. S. Dept. of Agr., 36 pp., 1910, separate, 1911.

BURKE, W. E.

52. Asphalt rock in Kentucky: Eng. and Min. Journ., vol. 75, pp. 969-970, 1 fig., 1903.

53. Fluorspar mines of western Kentucky and southern Illinois: Min. Industry for 1900, pp. 293-295, 1901.

BURROUGHS, E. H.

54. Bibliography of Petroleum and Allied Substances in 1916. U. S. Bureau of Mines, Bull. 165, pp. 159, 1919. Gives many titles on the geology and mineral resources of Kentucky.

54a. Bibliography of Petroleum and Allied Substances in 1919 and 1920. U. S. Bureau of Mines, Bull. 216, pp. 374, 1923. Gives many titles with reference to the geology and production of oil and gas in Kentucky.

BURROUGHS, WILBUR GREELEY.

54b. A Pottsville Filled Channel in the Mississippian. Ky. Geol. Survey, Series VI, Vol. X, pp. 115-126, 1923.

BUSHNELL, T. M.

Soil survey of Christian County: See Allen, R. T.

BUTTS, CHARLES.

55. Coal resources and general geology of the Pound quadrangle of Virginia and Kentucky: U. S. Geol. Surv., Bulletin No. 541-F, pp. 13-69, 1914.

56. Description and correlation of the Mississippian formations of western Kentucky. Kentucky Geol. Surv., in co-operation with U. S. Geol. Surv., part 1, 119 pp., 1918.

57. Geology of Jefferson County: Kentucky Geol. Surv., in co-operation with U. S. Geol. Surv., series 4, vol. 1, part 2, 270 pp., 64 pls., 1815.

58. Mississippian section in west central Kentucky: Abstract in Geol. Soc. Am. Bulletin, vol. 27, No. 1, pp. 155-156, March 31, 1916.

59. The Geology of Barren County, Ky., Dept. of Geol. and Forestry of Ky., Series V, Mineral and Forest Resources, Vol. 1, No. 3, 1919.

60. The Mississippian Series of Eastern Kentucky. Ky. Geol. Surv., Series VI, Vol. VII, 1922.

BYREM, LAWRENCE.

61. Concise description of the geological formations and mineral localities of the Western States, designed as a key to the geological map of the same, 48 pp., Boston, 1843. The map referred to is the D. D. Owen map (?).

CALDWELL, WILLIAM B., JR.

62. Notes on coal and iron ores of western Kentucky: From Courier-Journal, 1878.

63. Report on the limonite ores of Trigg, Lyon and Caldwell Counties: Kentucky Geol. Surv., vol. 5, part 5, second series, pp. 251-286, 1880. Reprinted on pages 178-196, in vol. D, western coal field: Kentucky Geol. Surv., 1884.

CALL, R. C.

64. Mammoth Cave of Kentucky, with an account of Colossol Cavern: See Hovey, Horace, and Call, R. C.

64a. Some preliminary notes on crystal growths in Mammoth Cave: Abstract, Science, new series, vol. 11, p. 750, 1900.

CAMPBELL, M. R.

65. Correlation of coal seams of Big Stone Gap coal fields of Virginia and Kentucky: Am. Inst. Mining Engrs., Transactions, vol. 21, pp. 1004-1005, 1893.

66. Estillville folio, Virginia, Kentucky, Tennessee: U. S. Geol. Surv., Geol. Atlas of the U. S., folio No. 12, 5 pp., 5 maps, 1 page section, 1894.

67. Geology of the Big Stone Gap coal field of Virginia and Kentucky: U. S. Geol. Surv., Bulletin No. 111, 106 pp., 6 pls., 3 figs., 1893.

68. London folio: U. S. Geol. Surv., Geol. Atlas of the U. S., folio No. 47, 3 pp., 4 maps, 1898.

69. Richmond folio. U. S. Geol. Surv., Geol. Atlas of the U. S., folio No. 46, 4 pp. (one of sections), maps, 1898.

70. Stratigraphy of the Pottsville series in Kentucky: Science, new series, vol. 11, p. 140, 1900.

CARR, LUCIEN.

See pp. 13, 45, 55.

CASSEDAY, S. A., and LYON, S. S.

71. Description of two new Genera and eight new Species of Fossil Crinoidea from the Rocks of Indiana and Kentucky. Proc. of the Amer. Academy of Arts and Sciences, Vol. (?), p. 15-31, 1860 (?). (Pvt. Lib., W. R. Jillson.)

CHAMBERLIN, T. C., and SALISBURY, R. D.

72. On the relationship of the Pleistocene to the pre-Pleistocene formations of the Mississippi basin south of the limits of glaciation: Am. Journ. Sci., 3d series, vol. 41, pp. 359-377, 1891. Reference to Kentucky.

73. Geology: Vol. II, Earth History, 692 pp., illustrated. Henry Holt & Co., N. Y. City, 1905. Numerous references to Paleozoic stratigraphy and structure of Kentucky.

CHAUVENET, W. M.

74. Notes on the samples of iron ore collected in Kentucky: 10th Census U. S., vol. 15, Mining Industries, pp. 289-300, map, Washington, 1886.

CLAPP, F. G., and others.

75. Petroleum and natural gas resources of Canada: Vol. 1, Vol. 2, Mines Branch Mem. 291, Ottawa, Can., 1915. Various references to oil and gas sands and production in Kentucky.

CHRISTY, DAVID.

76. Letters on geology written to John Locke, of Cincinnati: 68 plus 11 pages, Oxford, Ohio, 1848. Gives an account of the geology of the south and southwest, including Kentucky.

CLARK, JOHN MASON.

77. James Hall of Albany, 1811-1898. 565 pp., illustrated. Pub. privately, Albany, N. Y., 1921. References to Kentucky.

CLELAND, H. F.

78. Natural bridges of North America, with a discussion of their origin: Geol. Soc. of Am., Bulletin, pp. 313-388, 11 pls., 12 figs., July, 1910. Contains an account of some natural bridges in Kentucky.

79. Geology: Physical and Historical, 718 pp., illustrated. American Book Co., New York City, 1916. References to Kentucky.

COLLOM, R. E.

80. Prospecting and Testing for Oil and Coal. U. S. Bureau of Mines, Bull. No. 201, pp. 170. References to the Oil Sands of Ky., particularly the "Maxon" Sand of Eastern Kentucky.

CONRAD, TIMOTHY A.

81. Observations on the Silurian and Devonian systems of the United States, with description of new organic remains: Philadelphia Acad. Sci., Journ., vol. 8, pp. 228-235, 1842. Reference to Kentucky.

COOPER, THOMAS.

82. Some Information respecting America, etc. William Porter, Pub., Dublin, 1794, 240 pp. (Transylvania Univ. Lib.) Referances to Ky. climate, geology, roads, soil, mineral waters, etc., pp. 25-39.

COX, AUSTIN P.; BRIGGS, C. M.; PEEPLES, BENJAMIN, and WATKINS, O. R.

83. Report of the Commissioners Appointed to Mark the Boundary Line Between the State of Kentucky and Tennessee, to the Governor of Kentucky. Ky. State Doc., J. B. Major, Frankfort, Ky., 1860.

COX, EDWARD T.

84. Third and fourth annual reports for 1871 and 1872: Geol. Surv., Indiana, pp. 9-156, 183-189, Indianapolis, 1872. Reference to Kentucky.

85. Paleontological report, Coal measure mollusca: Kentucky Geol. Surv., vol. 3, pp. 559-576.

86. Western coal measures and Indiana coal. Geol. Surv. Indiana, second report, pp. 164-187, 1871. Am. Asso. Proc., vol. 20, pp. 236-252, 1872. Reference to Kentucky.

COZZENS, ISAACHER.

87. Description of Three New Fossils from the Falls of the Ohio. Annals of Lyceum of N. Y., pp. 157-159, vol. 4, 1846. (Priv. Lib., W. R. Jillson.)

CRANDALL, A. R.

88. Coals of the Big Sandy valley, south of Louisa and between Tug Fork and the headwaters of the North Fork of the Kentucky River: Kentucky Geol. Surv., Bulletin No. 4, 141 pp., 30 pls., 1905.
89. Coals of the Licking Valley and of some contiguous territory, including a reprint of the report on Elliott County: Kentucky Geol. Surv., Bulletin No. 10, 90 pp., 17 pls. (maps and sections), 1910.
90. Geology of Menifee County: Kentucky Geol. Surv., vol. C on Eastern Kentucky Coal Field, pp. 195-209, and a separate, 1884.
91. Occurrence of trap in eastern Kentucky: Am. Asso. Proc., vol. 34, pp. 236-237, 1885.
92. Preliminary report on the geology of Morgan, Johnson, Magoffin and Floyd Counties: Kentucky Geol. Surv., part 5, vol. 6, second series, 24 pp., 6 pls. (sections), 1 map. No. date.
93. Report on Elliott County, including an account of the trap dikes, by Crandall and Diller: Kentucky Geol. Surv., 16 pp., 1886.
94. Report on Greenup, Carter, Boyd and a part of Lawrence Counties: Kentucky Geol. Surv., vol. C, Eastern Coal Field, pp. 1-78, 1884.
95. Report on the Chinn cannel coal district: Kentucky Geol. Surv., vol. C, pp. 289-296, 1884.
96. Report on the coal beds of the Tug Fork region, Martin and Pike Counties: Kentucky Geol. Surv., Report of Progress for 1908-1909, pp. 36-54, 1 pl. (sections), 1910.
97. Report on the geology of Whitley and a part of Pulaski Counties: Kentucky Geol. Surv., vol. C, part 2, Southeastern Kentucky Coal Field, pp. 115-159, no date.
98. Report on the Pound Gap region: Kentucky Geol. Surv., vol. C, part 2, pp. 5-29, letter of transmissal dated June 15, 1885. Reprinted in Inspector of Mines' Report for 1901-2.
99. Report on the proposed line of the Elizabethtown, Lexington and Big Sandy Railroad, from Mt. Sterling to the Big Sandy River. Kentucky Geol. Surv., pp. 10, 1 pl. (section). No date (1877?).

CRANDALL, A. R., and SULLIVAN, GEORGE M.

100. Report on the coal field adjacent to Pineville Gap in Bell and Knox Counties, Kentucky: Kentucky Geol. Surv., Bulletin No. 14, 130 pp., 15 pls. (maps), 84 figs., 1912.

CRIDER, A. F.

101. Clays of western Kentucky and Tennessee: U. S. Geol. Surv., Bulletin No. 285, pp. 417-427, 1 pl., 1906.
102. Coals of Letcher County: Kentucky Geol. Surv., 234 pp., 2 figs., 1 pl., 2 maps, 1916.
103. Coals of the Nortonville, Drakesboro, Dunmor and Little Muddy Quadrangles: Kentucky Geol. Surv., series 4, vol. 3, part 1, 182 pp., 3 figs., 4 maps, 1915.
104. Fire clays and fire clay industries of the Olive Hill and Ashland districts: Kentucky Geol. Surv., series 4, vol. 1, part 2, pp. 589-711, 1913.
105. Geology and Economic Products of the Earlington Quadrangle: Ky. Geol. Surv., Series IV, Vol. II, Part I, pp. 99, 1914. (Edition exhausted.)
105a. Report on the Geology and Mineral Resources of the Dawson Springs Quadrangle: Ky. Geol. Surv., Series IV, Vol. II, Part I, pp. 63, 1914. (Edition exhausted.)
106. Economic geology of the Tell City and Owensboro Quadrangles: Kentucky Geol. Surv., series 4, vol. 1, part 1, pp. 261-316, 1913.

CROUSE, CHARLES STEVENS.

107. Retorting Methods as Applied to Kentucky Oil Shales, Ky. Geol. Surv., Series VI, Vol. VI, Paper VI, pp. 155-189, 1921. A full discussion of retorting methods and their application in Kentucky.

CROUSE, CHARLES STEVENS, and others.

108. Discussion of Kentucky Oil Shales at Natinoal Oil Shale Conference. Proc. Am. Mining Congress. 24th Am. Con., pp. 458-477, 1921. References to Kentucky.
108a. Some Economic Aspects of the Kentucky Oil Shales. Combustion (Mag.) pp. 337-343, vol. VII, No. 6, 43 Broad St., N. Y. City. Dec. 1922.

CRUMP, M. H.

109. Clays and building stones of Kentucky: Eng. and Mining Journ., vol. 66, pp. 190-191, 1898.
110. Oolitic building stone of the Bowling Green field: Abstract, Science, new series, vol. 43, p. 397, March 17, 1916.
111. Oolitic limestone of Warren County: Kentucky Geol. Surv., series 4, vol. 1, part 2, pp. 1037-1053, 1913.
112. Kentucky asphalt: Ibid, pp. 1053-1065.

CURRIER, LOUIS WADE.

113. Fluorspar Deposits of Kentucky. Ky. Geol. Surv., Series VI, Vol. XIII, illustrated. A detailed discussion of the origin and occurrence of Fluorspar in Kentucky with statements as to production.

DADDOW, S. H.

114. Coal, iron and oil, or the practical American miner. 808 pp., map, Pottsville, 1886. Reference to Kentucky.

DARNELL, J. L. (See Arnold, Ralph, and Darnell, J. L.)

DAVIE, W. J.

115. The Resources and Condition of the Commonwealth of Kentucky: Ky. State Bureau Agr., Hort., and Stat. pp. 760. First Ann. Report. 1877. Refers to areal geology of Livingston, Crittenden, Lyon, Caldwell, Trigg' Christian' Todd, Logan, Simpson, Warren, Allen, Monroe, Barren, Butler and Edmonson Counties, Kentucky.

DAVIS, D. H.

116. Geography of the Jackson Purchase Region. Ky. Geol. Surv., Series VI, Vol. IX, pp. —, illustrated, 1922. A detailed regional geographic study of this part of Kentucky.

DAVIS, W. J.

117. Kentucky fossil corals: Kentucky Geol. Surv. Monograph, 138 pls. (no text), 1885.

DAY, DAVID T., and others.

118. A handbook of the petroleum industry, 2 vols., 1970 pp. John Wiley & Sons, N. Y. City, 1922. Numerous references and tables on Kentucky.

DEMARET, LEON.

119. Les principaux gisements de minerais de zinc des Etats Unis d'Amerique: Revue universelle des Mines (Liege and Paris), 4 e ser., t. 6, pp. 221-256, 6 pls., 1904. Reference to Kentucky.

DILLER, J. S., and KUNZ, GEO. F.

120. Is there a diamond field in Kentucky? Science, vol. 10, pp. 140-142, 1887.

121. Dikes of peridotite cutting the carboniferous rocks of Kentucky; Science, vol. 5, p. 65, 1885.

122. Genesis of the diamond: Science, vol. 8, p. 392, 1888, and Kentucky Geol. Surv., Geology of Elliott County by A. R. Crandall, pp. 25-28, 1888.

123. Mica-peridotite from Kentucky: Am. Journn. Sci., 3d ser., vol. 44, pp. 286-289, 1892.

124. Notes on the peridotite of Elliott County, Kentucky: Am. Journ. Sci., 3d series, vol. 32, pp. 121-125, 1885. Reprinted in Kentucky Geol. Surv. of Elliott County by A. R. Crandall, 1886.
125. Peridotite of Elliott County, Kentucky: U. S. Geol. Surv., Bulletin No. 38, vol. 6, pp. 357-385, 1887.
126. Supplementary note on the peridotite of Elliott County, Kentucky: Am. Jour. Science, 3d series, vol. 37, pp. 219-220, 1889.

D'INVILLIERS, E. V.
127. Resources of the Upper Cumberland Valley, etc.: See McCreath, Andrew S., and D'Invilliers, E. V.

DILWORTH, J. B.
127a. Black Mountain coal district, Kentucky, The: Am. Inst. Min. Eng. Bulletin, No. 62, pp. 149-176, 3 figs., 1912. Trans. vol. 43, pp. 129-156, 1913.

DRAKE, DANIEL.
128. Geological account of the valley of the Ohio: Am. Phil. Soc. Trans., vol. 2, new series, pp. 124-139, 1825. Reference to Kentucky.

DUDLEY, WILLIAM L.
129. A curious occurrence of vivianite near Eddyville, Kentucky. Am. Journ. Sci., 3d series, vol. 40, pp. 120-121, 1890.

EAKINS, L. G.
130. Metamorphic rock from Marion, Kentucky: (Analysis): U. S. Geol. Surv., Bulletin No. 64, p. 46, 1890.

EASTMAN, CHARLES R.
131. Brain structure of fossil fishes from Caney shales: Abstract, Geol. Soc. Am. Bulletin, vol. 24, No. 1, pp. 119-120, March 24, 1913. The material described came from Boyle County.
132. Tamiobatis vetustus, a new form of fossil skate: Am. Journ. Sci., 4th series, vol. 4, pp. 85-90, pl. 1, fig. 1, 1897. Material described came from Kentucky.

EASTON, H. D.
133. Technology of Kentucky clays, etc.: Kentucky Geol. Surv., series 4, vol. 1, part 2, pp. 713-888, 1913.

ECKEL, E. C.
134. Clay resources of northeastern Kentucky: U. S. Geol. Surv., Bulletin 288, 1906.

EDMONDS, RICHARD H.
135. The South of Yesterday, Today and Tomorrow. Pub. by Mfgs. Record, Baltimore, Md., 1922. Many references to Kentucky mineral and natural resources.

ELDRIDGE, GEO. H.

136. Bituminous and asphalt rocks of the United States: U. S. Geol. Surv., 22nd Annual Report, pp. 211-452, 1901. Contains an account of the bituminous sandstone in Kentucky, compiled from a report made by S. D. Averitt.

ELKHORN COAL CORP.

137. Views of the Elkhorn Coal Field of Kentucky. Priv. Pub. by Elkhorn Coal Corp., Bankers Trust Bldg., N. Y. City. 75 full-page photos, 2 maps.

EMMONS, EBENEZER.

138. Geology of the Second (Third?) District of New York: 1842. Reference to Kentucky.

EMMONS, SAMUEL FRANKLIN.

139. Fluorspar deposits of southern Illinois: Am. Inst. Mining Engrs., Trans., vol. 21, pp. 3153, 1893. Reference to Kentucky.

EMMONS, WILLIAM HARVEY.

140. The Principles of Economic Geology, pp. 606, illustrated, McGraw-Hill Book Co., New York City, 1918. References to Kentucky minerals, flourspar, p. 560; iron, p. 328.

141. Geology of Petroleum, pp. 610, illustrated, McGraw-Hill Book Co., New York City, 1921. Brief presentation of Kentucky oil and gas geology, pp. 27, 53, 205 and 233-244.

142. General Economic Geology, pp. 516, illustrated, McGraw-Hill Book Co., New York City, 1922. Discussion of the geology and production of Kentucky coal, fluorite, iron ore, lithographic stone, and petroleum.

ESTABROOK, ARTHUR H.

142a. The Family History of Robert Owen. Indiana Mag. of History, vol. XIX, No. 1, pp. 62-101, March, 1923. Sketch of the life and ancestry of David Dale Owen, 1st State Geologist of Kentucky.

EVANS, A. W.

143. Jellico coal field: Eng. Asso. of the South, Trans., vol. 15, pp. 43-52, 1905.

EVANS, H. A.

144. Relations of the flora to the geological formations in Lincoln County, Kentucky: Botanical Gazette, 1889.

FABER, C. L.

144a. Description of some sub-Carboniferous and Carboniferous cephalopoda. See Miller, S. A., and Faber, C. L.

FALES, J. C.

145. Report of the geology of Boyle County: Kentucky Geol. Surv., 1881?

FENNEMAN, N. M.

146. On the preglacial Miami and Kentucky rivers: Abstract, Geol. Soc. Am. Bulletin, vol. 23, No. 4, p. 736, Dec. 17, 1912.

FIELDNER, ARNO C., and others.

147. Analyses of mine and car samples of coal collected in the fiscal years 1916 to 1919: U. S. Bureau of Mines, Bull. 193, 1922. References and analyses of Christian and Letcher Counties, pp. 165, 166, 167.

FISCHER, MORITZ.

148. Natural gas in Kentucky: U. S. Geol. Surv., Mineral Resources, 1887, pp. 489-492, 1888.

149. Oil field of Barren County: Eng. and Mining Journ., vol. 49, pp. 197-198, 1890.

FOERSTE, AUGUST F.

150. Age and development of the Cincinnati anticline: Abstract, Science, new series, vol. 10, p. 488, 1899.

151. Age of the Cincinnati anticlinal: Am. Geologist, vol. 7, pp. 97-109, 1891.

152. Arnheim formations within areas traversed by the Cincinnati geanticline: Ohio Naturalist, vol. 12, No. 3, pp. 429-456, 3 pls., Jan., 1912. And reprint.

153. Bearing of the Clinton and Osgood formations on the age of the Cincinnati anticline: Abstract, Science, new series, vol. 15, p. 90, 1902; Geol. Soc. Am. Bulletin, vol. 13, p. 531, 1903.

154. Bedford fauna at Indian Fields and Irvine, Kentucky: Ohio Naturalist, vol. 9, No. 7, pp. 515-523, 1 pl., May, 1909. Excerpt published in advance from matter prepared for the Kentucky Geol. Surv.

155. Brachiopoda of the Richmond group: Abstract, Science, new series, vol. 29, p. 635, April 16, 1909.

156. Chemical study of the Trenton and Stones River rocks in central Kentucky. Kentucky Geol. Surv., fourth series, vol. 1, pp. 387-439, 2 figs., map, 1913.

157. Cincinnati anticline in southern Kentucky: American Geologist, vol. 30, pp. 359-369, 1 pl., Dec., 1902. And reprint.

158. Classification of the Ordovician rocks of Ohio and Indiana: Science, new series, vol. 22, pp. 149-152, 1905. Reference to Kentucky.

159. Clinton conglomerate and wave marks in Ohio and Kentucky: Journ. of Geol., vol. 3, pp. 5060 and 169-197, 1895. And reprint.

160. Fossils from the Silurian formations of Tennessee, Indiana and Kentucky: Denison Univ. Sci. Lab. Bulletin, vol. 14, pp. 61-116, 4 pls., 1909.

161. Further studies on the history of the Cincinnati anticline: Abstract, Science, new series, vol. 11, p. 145, 1900.

162. Identification of Trenton and lower geological horizons: Kentucky Geol. Surv., 4th series, vol. 1, pp. 365-376, 1913.

163. Middle Silurian rocks of the Cincinnati anticlinal region, with their synonymy: 24th Annual Report of the Department of Geology and Natural Resources of Indiana, pp. 41-80, 1899.

164. Niagara group along the western side of the Cincinnati anticline: Abstract, Science, new series, vol. 13, pp. 134-135, 1901.

165. Notes on Agelacrinidae and Lepadocystinae with descriptions of Thresherodiscus and Brockocystis: Denison Univ. Sci. Lab. Bulletin, vol. 17, pp. 399-474, 6 pls., 8 figs., 1914.

166. Notes on Silurian fossils from Ohio and other central State: Ohio Journl. of Science, no date.

167. Oil, gas and asphalt rock in Meade and Breckinridge Counties: Kentucky Geol. Surv., Rept. Progress for 1908-9, pp. 69-85, 1910.

168. On Clinton oolitic iron ores. Am. Journ. Sci., 3d series, vol. 41, pp. 23-29, 1891. And reprint.

169. Ordovician-Silurian contact in the Ripley Island area of southern Indiana, with notes on the age of the Cincinnati geanticline: Am. Journ. Sci., vol. 18, pp. 321-342, 2 pls., 1904. Reference to Kentucky.

170. Phosphate deposits in the upper Trenton limestones of central Kentucky: Kentucky Geol. Surv., series 4, vol. 2, part 1, pp. 387-439, 2 figs., map, 1913.

171. Preliminary notes on Cincinnatian and Lexington fossils of Ohio, Indiana, Kentucky and Tennessee: Denison Univ. Sci. Lab. Bulletin, vol. 14, pp. 289-334, 5 pls., Nov., 1909.

172. Report on the value of the Dix River as a source of water power: Kentucky Geol. Surv., Bulletin No. 21, 63 pp., pls., tables, 1912.

173. Richmond group along the western side of the Cincinnati anticline in Indiana and Kentucky: Am. Geol., vol. 31, pp. 333-361, June, 1903, and reprint.

174. Rogers Gap fauna of central Kentucky: Cin. Soc. of Nat. Hist., Journ., vol. 21, No. 4, pp. 109-156, 4 pls., May, 1914.

175. Silurian and Devonian limestones of Tennessee and Kentucky: Geol. Soc. Am. Bulletin, vol. 12, pp. 395-444, pls. 25-41, 1901.

176. Silurian and Devonian limestones of western Tennessee: Journ. Geol., vol. 11, pp. 554-583, 6 figs., 1903. Reference to Kentucky.
177. Silurian, Devonian and Irvine formations of east central Kentucky, with an account of their clays and limestones: Kentucky Geol. Surv., Bulletin No. 7, 369 pp., 33 pls. (incl. 7 maps), 1906.
178. Silurian fossils from the Kokomo, West Union and Alger horizons of Indiana, Ohio and Kentucky: Cin. Soc. Nat. Hist., Journ., vol. 21, No. 1, pp. 1-41, 2 pls., Sept., 1909.
179. Dictyophlois Reticulata Gen. Et. Sp. Nov. (from the Bulletin of the Torrey Botanical Club, 42: pp. 675-677, pls. 33, Jan. 22, 1917).
180. Some Kentucky clays, including kaolinitic, plastic and fire clays. Kentucky Geol. Surv., Bulletin No. 5, pp. 143-178, 1905.
181. Strophomena and other fossils from Cincinnatian and Mohawkian horizons, chiefly in Ohio, Indiana and Kentucky: Denison Univ. Sci. Lab. Bulletin, vol. 17, pp. 37-48, 1 fig., map, 1912.
182. Supplementary report on Dix River drainage: Kentucky Geol. Surv., 3 pp., 1912.
182a. Waverly formations of east central Kentucky: See Morse, W. C., and Foerste, August F.

FOHS, F. JULIUS.

183. Barytes and associated deposits of central Kentucky: Kentucky Geol. Surv., Report of Progress for 1908-1909, pp. 94-99, 1910.
184. Barytes deposits in Kentucky: Kentucky Geol. Surv., series 4, vol. 1, part 1, pp. 441-575, 1913.
185. Notes on some lead, zinc and other prospects outside the central Kentucky barytes district: Ibid., pp. 576-578.
186. Coals of the region drained by quicksand creeks in Breathitt, Floyd and Knott Counties: Kentucky Geol. Surv., Bulletin No. 18, 79 pp., 8 pls. (maps), 1912.
187. Fluorspar deposits of Kentucky with notes on the production, mining and technology of the mineral in the United States; also some data concerning barite deposits: Kentucky Geol. Surv., Bulletin No. 9, 296 pp., 26 pls., 1907.
188. Fluorspar, lead and zinc deposits of western Kentucky: Economic Geology, vol. 5, No. 4, pp. 377-386, 1910.
189. Kentucky fluorspar and its value to the iron and steel industries: Am. Inst. Mining Eng., Bulletin No. 28, pp. 411-423, April, 1909, abstract; Mining World, vol. 30, pp. 1217-1220, June 26, 1909; Transactions, vol. 40, pp. 260-273, 1910, and U. S. Geol. Surv. Bulletin No. 444, p. 42.

190. Oil and gas possibilites of Kentucky: Am. Institute of Mining Eng., Bulletin No. 9, pp. 621-628, 1915. Transactions, vol. 51, pp. 644-956, 2 figs., 1916.

191. Resources of Lewis and Rowan Counties: Kentucky Geol. Surv., Report of Progress for 1908-1909, pp. 99-101, 1910.

192. Statistics, etc., on mining fluorspar, barytes and calcite in Kentucky for 1907, 1908 and 1909, Kentucky Inspector of Mines' Report, pp. 20-47, 1909.

FOSTER, J. W.

193. Mississippi Valley—its physical geography, etc.: 443 pp., maps, Chicago and London, 1869. Reference to Kentucky.

194. On the geological position of the deposits in which occur the remains of the fossil elephant of North America: Am. Asso. Proceedings, vol. 10, part 2, pp. 148-169, 1857. Reference to Kentucky.

FREEMAN, HENRY C.

195. Earthquake phenomena: Eng. and Mining Journ., vol. 44, pp. 110-111, 1887. Reference to Kentucky.

FULLER, MYRON L.

196. Appalachian oil field: Geol. Soc. of America Bulletin, vol. 27, No. 3, pp. 617-654, 5 figs., Sept. 30, 1917. Reference to Kentucky.

197. New Madrid earthquake: U. S. Geol. Surv. Bulletin No. 494, 119 pp., 10 pls., 18 figs., 1912. Abstract by A. H. Brooks, Wash. Acad. Sci. Journ., vol. 2, No. 14, pp. 350-351, Aug., 1912. The earthquake affected southwestern Kentucky.

FUNKHOUSER, W. D.

198. Wild Life in Kentucky. Ky. Geol. Surv., Series VI, Vol. XVI, illustrated, 1923. A systematic and detailed presentation of an accurate State list written in a semi-popular style for Audubon Societies, Bird and Animal Clubs and supplementary reading in schools and colleges.

GARDNER, JAMES H.

199. Economic geology of the Hartford Quadrangle: Kentucky Geol. Surv., Bulletin No. 20, 25 pp., 4 pls. (maps), 1912. Contains also report on the soils of the quadrangle by S. C. Jones.

200. Kentucky as an oil State: Science, new series, vol. 46, pp. 279-280, Sept. 21, 1917.

201. Mammoth Cave of Kentucky: Mines and Minerals, vol. 31, No. 12, pp. 720-722, 4 figs., July, 1911.

202. Oolitic limestone at Bowling Green and other places in Kentucky: U. S. Geol. Surv., Bulletin No. 430, pp. 273-378, 1910.

203. Rock phosphate in Kentucky: Mines and Minerals, vol. 33, pp. 207-209, 3 figs., 1912.

204. Some Kentucky clays: Kentucky Geol. Surv., Bulletin No. 6, 223 pp., 1905.

205. Some notes on the Mammoth Cave, Kentucky: Abstract, Science, new series, vol. 31, pp. 718-719, May 6, 1910.

206. Stratigraphic disturbance through the Ohio Valley, running from the Appalachian Plateau in Pennsylvania to the Ozark Mountains in Missouri, A: Geol. Soc. Am. Bulletin, vol. 26, No. 4, pp. 477-483, 1 fig. (map), Dec. 4, 1915. Abstract No. 1, p. 66, March 31, 1915.

GAVIN, MARTIN J.

207. The next Mining Problem: Proc. Am. Mining Congress, pp. 497-506, 1920. References to Kentucky.

208. Oil Shale—Am. Historical, Technical, and Economic Study: U. S. Bureau of Mines, Bull. 210. Pub. by State of Colorado, Denver, 1922. Sketch of Ky. oil shale, pp. 22, 23, 24, 25.

GEISH, W. J.

208a. Soil survey of Warren County: See Rice, Thomas D., and Geish, W. J.

GEOL. SURVEY, U. S.

209. A list of the Publications of the United States Geological Survey (not including topographic maps), 192 pp., August, 1921, Washington, D. C. A list of all U. S. Geol. Surv. publications relative to Kentucky geology and mineral resources.

GILES, ALBERT W.

209a. The Geology and Coal Resources of Dickenson County, Va. Virginia Geol. Survey, Bull. XXI, 1921.

GIRTY, GEORGE H.

210. Description of a fauna found in the Devonian black shale of eastern Kentucky: Am. Journ. Sci., 4th series, vol. 6, pp. 384-394, 1 pl., 1898.

GLENN, L. C.

211. Coals of the Tradewater region: Kentucky Geol. Surv., Bulletin No. 17, 75 pp., 1 pl., 1912.

212. Fossiliferous sandstone dikes in the Eocene of Kentucky and Tennessee: Abstract, Science, new series, vol. 19, p. 522, 1904.

213. Geology of Webster County: Kentucky Geol. Surv., Report of Progress for 1910 and 1911, pp. 25-35, 1912.
214. Hydrology and geology of the Gulf embayment area of west Tennessee, west Kentucky and southern Illinois: Abstract, Science, new series, vol. 23, p. 288, Feb. 23, 1906. Am. Asso. Adv. Sci. Proc., vol. 55, p. 377, 1906.
215. Notes on the wells, springs and general water resources of western Kentucky: U. S. Geol. Surv. Water Supply and Irrigation Paper No. 102, pp. 369-373, 1904.
215a. Resources of a part of the Cumberland Gap coal field of Kentucky: See Ashley, G. W., and Glenn, L. C.
216. Underground waters of eastern United States: Tennessee and Kentucky: U. S. Geol. Surv., Water Supply and Irrigation Paper No. 114, pp. 198-208, 1905.
217. Underground waters of Tennessee and Kentucky west of Tennessee River and of an adjacent area in Illinois: U. S. Geol. Surv. Water Supply and Irrigation Paper No. 164, 173 pp., 7 pls., 13 figs., 1906.
218. Geology and Coals of Webster County, Kentucky: Ky. Geol. Surv., series VI, vol. V, pp. 262, 1922. A detailed geological presentation of the stratigraphy and structure of Webster County, Ky.

GLENN, L. C., and ASHLEY, G. H. (See Ashley, G. H., and Glenn, L. C.)

218a. Oil Development in Kentucky and Tennessee during 1922. Published in Symposium on Petroleum and Gas. Trans of the Am. Inst. of Mining and Metal. Engs., April, 1923.

GORBY, S. S.

219. The onyx deposits of Barren County, Kentucky: Eng. and Mining Journal, vol. 67, pp. 707-708, 2 figs., 1899.

GRABAU, AMADCUS W.

220. Principles of Stratigraphy, pp. 1185. A. G. Siler & Co., N. Y. City, 1913. Refers to coral reefs in vicinity of Louisville, Ky., p. 420, and other mscl. references.
221. Textbook of Geology, vol. I, 976 pp., vol. II, 864 pp., D. C. Heath & Co.; vol. I, 1920; vol. II, 1921. Many references to Kentucky, especially Chattanooga black shale and the coral reefs at Louisville.

GRASTY, J. SHARSHALL.

221a. Barite of the Appalachain States: See Watson, Thomas L., and Grasty, J. Sharshall.

GREAVES-WALKER, A. F.

222. The flint fire clay deposit of northeastern Kentucky: Am. Ceramic Soc., Trans., vol. 9, pp. 461-472, 1 fig., 1907.

GRIFFEN, A. M., and AYRS, O. L.

223. Soil survey of Madison County: Field operations of the Bureau of Soils, 1905. Issued also as a separate.

GRIFFITH, W. T.

224. Big Sandy coal fields, Kentucky: Eng. and Min. Journ., vol. 92, pp. 508-510, 1 fig. (map), Sept. 9, 1910.

GROVER, N. C.

225. Surface water supply of the United States: U. S. Geol. Surv. Water Supply Paper No. 433, 237 pp., 2 pls., 1916. Reference to Kentucky.

226. Surface Water Supply of the United States: U. S. Geol. Surv. Water Supply, Paper No. 473, 115 pp., 2 pls., 1922. Many references to Kentucky, tables of flow for principal streams.

GURLEY, F. E.

226a. New species of crinoids, cephalopods anl other Paleozoic fossils: See Miller, S. A., and Gurley, F. E.

HALL, JAMES.

227. Geology of New York—Fourth or Western District: 37, 685 pp., Albany, 1843. Reference to Kentucky.

228. Geological survey of the State of New York: Paleontology, containing description of fossils from the Upper Helderberg, Hamilton, Portage and Chemung groups, vol. 5, part 2, text 15, 492 pp., 1879. Abstract, Am. Journ. Sci., 3d series, vol. 15, p. 395, 1879. Reference to Kentucky.

229. Hydraulic beds and associated limestones at the Falls-of-the-Ohio: Albany Inst., Transactions, vol. 9, pp. 169-180, 1879. Also in Paleontology of New York, vol. 5, part 2.

230. Nature of the strata and geographical distribution of the organic remains in the older formations of the United States: Boston Journ. Nat. Hist., vol. 5, 20 pp., 1847. Reference to Kentucky.

231. Note upon the history and value of the term Hudson River group in American geological nomenclature: Am. Asso. Proc., vol. 26, pp. 259-265, 1878. Abstract: Am. Journ. Sci., 3d series, vol. 16, p. 482, 1878. Reference to Kentucky.

232. Notes explanatory of a section from Cleveland, Ohio, to the Mississippi River, in a southwest direction, with remarks upon the identity of the western formations with those of New York: Asso. Am. Geol. Transactions, pp. 267-293, 1843. Reference to Kentucky.

233. Notes on the geology of the Western States: Am. Journ. Sci., vol. 42, pp. 51-62, 1842. Reference to Kentucky.

233a. Map of Canada and part of the United States: 1886. See Logan, William E., and Hall, James.

234. On the geographical distribution of fossils in the older rocks of the United States: Am. Journn. Sci., vol. 45, pp. 157-160, 162-163, 1843. Reference to Kentucky.

Hamor, William Allen, and Bacon, Raymond Foss (See Bacon, Raymond Foss, and Hamor, William Allen).

HARWOOD, F. H.

235. The fluorspar and zinc mines of Kentucky: Mining and Sci. Press, vol. 86, pp. 8788, 101-102, 1903.

HASSE, ADELAIDE R.

236. Index of Economic Material in Documents of the States of the United States (Kentucky 1792-1904), 452 pp. Carnegie Inst., Washington, Publication No. 85, January, 1910. A very complete finding list within the dates given relating to Kentucky geology.

HAYES, CHARLES WILLARD.

237. The southern Appalachian coal field: U. S. Geol. Surv., 22nd Annual Report, part 3, pp. 227-263, 3 pls, 1 fig., 1902.

HEAD, JEREMIAH.

238. Coal industry of the Southeastern States of North America: North of England Inst. Mining and Mech. Engrs., Transactions, vol. 46, pp. 167-182, 3 figs., 1897.

HEILPRIN, ANGELO.

239. Tertiary geology of the eastern and southern United States: Philadelphia Acad. Sci. Journ., vol. 9, part 1, pp. 115-154 (map), 1884. Reference to Kentucky.

240. Tertiary fossils from Kentucky, Texas and Florida: Science, vol. 7, p. 103, 1886.

241. Notes on the Tertiary geology and paleontology of the southern United States: Phila. Acad. Sci. Proc., vol. 37, pp. 57-58, 1886. Reference to Kentucky.

HENDRIE, CHARLES.

242. Notes on the cannel coals of Kentucky: Kentucky Inspector of Mines Report, pp. 130-152, 1893.

HILGARD, EUGENE.

243. General features of the alluvial plain of the Mississippi River below the mouth of the Ohio: 10th Census U. S., vol. 5, Report on Cotton Production in the United States, pp. 73-76, 1884. Reference to Kentucky.

244. On the geological history of the Gulf of Mexico: Am. Journ. Sci., 3d series, vol. 2, pp. 391-404, map, 1871. Also published in Am. Asso, Proc. and in Louisiana State Univ. Report for the same year. Reference to Kentucky.

245. Review of the general soil map of the Cotton States: 10th Census U. S., vol. 5, Report on Cotton Production in the United States, part 1, pp. 1516, agricultural map of the Cotton States, 1884. Reference to Kentucky.

HITCHCOCK, CHARLES H., and BLAKE, W. P.

246. Geological map of the United States, with statistics of mines and mining in the States and Territories west of the Rocky Mountains: 5th Report, by R. W. Raymond, Washington, 1873. Reprinted in atlases, special reports and other publications in 1875, 1876, 1877 and 1878. Includes Kentucky.

247. Geological map of the United States and Canada: Am. Inst. Mining Eng. Trans., map 17 by 27 inches, explanation, vol. 15, pp. 465-488, 1887. Includes Kentucky.

248. Map of the coal fields of the United States, compiled from State reports: Statistical Atlas of the United States, based on results of 4th Census, 1870, compiled by F. A. Walker, Washington, 1874. Includes Kentucky.

HODGE, JAMES M.

249. Big Stone Gap coal fields: Am. Inst. Mining Engrs., Trans., vol. 21, pp. 922-938 and 1005-1006, 1893.

250. Coals of Main Leatherwood Creek, Perry County: Kentucky Geol. Surv., series 4, vol. 2, part 2, pp. 11-67, 1914.

251. Coals of Middle Fork of Kentucky River, Leslie and Harlan Counties: Kentucky Geol. Surv., Ser. 4, vol. 5, part 1, 166 pp., 1918.

252. Caols of Goose Creek and its Tributaries: Ser. 4, vol. 2. part 2, pp. 73-146.

253. Coals of the North Fork of the Kentucky River from Hazard to Krypton: Ibid, pp. 151-198.

254. Coals of the North Fork of the Kentucky River in Perry and portions of Breathitt and Knott Counties: Kentucky Geol. Surv., Ser. 4, vol. 1, part 3, 418 pp., 1918.

255. Coals of the headwarters of the Licking River, Magoffin County: Kentucky Geol. Surv., series 4, vol. 1, part 2, pp. 889-986, 1913.

256. Coals of the Upper Carr's Fork and Big Branch of Bull Creek region of North Fork of Kentucky River: Ibid, pp. 987-1036.

257. Coals of the Three Forks of the Kentucky River: Kentucky Geol. Surv., Bulletin No. 11, 280 pp., 1 pl., 223 figs. (maps and sections), 1910.

258. Report on part of Letcher, Harlan, Leslie, Perry and Breathitt Counties: Kentucky Geol. Surv., vol. C, part 2, pp. 35-52, 1885.

259. Geology of the Lower North Fork and Middle and South Forks of the Kentucky River: Ibid., pp. 57-114. Both reports reprinted in Inspector of Mines' Report for 1901-2.

260. Supplementary report on the coals of Clover and Poor Forks, Harlan County, Kentucky: Kentucky Geol. Surv., 64 pp., map, 1916.

261. Upper Cumberland coal field: Kentucky Geol. Surv., Bulletin No. 12, 223 pp., 6 pls. (incl. map), 227 figs., 1912.
Hodge, James M., and Jillson, W. R. (See Jillson, W. R., and Hodge, James M.).

HODGE, JAMES M., and RUSSELL, PHILIP G.
262. Clay County: Kentucky Geol. Surv., series 4, vol. 4, part 3, 260 pp., 1918.

HODGES, H. F.
263. Survey of Big Sandy River, West Virginia and Kentucky, Including Levisa and Tug Forks, pp. 1-32, 83 sections. Pub. by House of Representatives (Document No. 326), 56th Congress, Jan. 20, 1900. (Reference Oil and Gas, p. 17; reference Coal, pp. 18-60.)

HOEING, J. B.
264. Coal analyses in the western field: Kentucky Geol. Surv., series 4, vol. 2, part 1, 1914.
265. Coals of the upper Big Sandy valley and the headwaters of the North Fork of the Kentucky River: Kentucky Geol. Surv., 4th series, vol. 1, pp. 79-261, 1913.
266. First annual report: Kentucky Geol. Surv., 4th series, vol. 1, 78 pp., 1913.
267. Oil and gas: Kentucky Geol. Surv., series 4, vol. 1, part 1, pp. 21-61.
268. Barite, fluorspar, lead and zinc: Ibid., pp. 62-66.
269. Water power: Ibid., pp. 67-78.
270. Coals of the upper Big Sandy Valley: Ibid., pp. 79-262.
271. Oil and gas sands of Kentucky: Kentucky Geol. Surv., Bulletin No. 1, 233 pp., 10 pls., 3 maps, 1905.
272. Preliminary geological map of Kentucky: Kentucky Geol. Surv., scale 1 inch equals 10 miles, 1907.
273. List of Elevations, Above Sea Level, of Points in Kentucky. Ser. 4, vol. 1, part 2.
Compiled from the Work of the Survey and the Profiles of the Various Railroad and River Surveys.

274. List of Astronomical Stations in Kentucky. Ibid. Determined by the U. S. Coast and Geodetic Survey. Printed at Frankfort, Ky., Capital Office, E. Polk Johnson, Public Printer and Binder, 1889.

HOFFMAN, G. M.

275. Report upon the Improvement of Rivers and Harbors in the Louisville, Kentucky, District. Washington Government Printing Office, 1919. (Annual Report of the Chief of Engineers, 1919 Extract.) Reference to Kentucky.

HOVEY, HORACE C.

276. Bibliography of the Mammoth Cave: Abstract Geol. Soc. America, Bulletin, vol. 23, No. 4, p. 747, Dec., 1912.

277. Colossal Cavern of Kentucky: Spelunca, t. 5, pp. 57-61 (247-251), 2 figs., 1904. Sci. Amer., vol. 65, p. 183, 1896.

278. Handbook of Mammoth Cave of Kentucky. A practical guide to the regulation routes with maps and illustrations: John P. Morton & Co., Louisville, 64 pp., 1912.

279. Making of Mammoth Cave, The: Sci. American, vol. 75, p. 151, 1896.

280. Mammoth Cave: Article in Encyclopedia Brittanica, 2 pp., with map.

281. Pits and domes of Mammoth Cave: Am. Asso. Adv. Sci. Proc., vol. 38, pp. 253-255, 1890.

282. Recent exploration in Mammoth Cave, with revised map of cave: Abstract, vol. 28, p. 381, Sept. 18, 1908.

HOVEY, HORACE C., and CALL, R. C.

283. Mammoth Cave of Kentucky with an account of Colossal Cavern: John P. Morton & Co., revised edition, 131 pp., illustrations, Louisville, 1912.

HOVEY, HORACE CARTER, and CALL RICHARD ELLSWORTH.

284. The Mammoth Cave of Kentucky, an Illustrated Manual, 112 pp., 25 pls., 2 maps. John P. Morton & Co., Louisville, Ky., 1897. Contains historical notes, scenic accounts, descriptive and scientific items based on new and original explorations.

HOWELL, EDWIN E.

285. Description of the Williamstown meteorite: Am. Journ. Sci., 4th series, vol. 25, pp. 49-50, 1 fig., Jan., 1908.

286. Two new meteorites: Science, new series, vol. 27, pp. 27-28, Jan. 3, 1908. One meteorite described is the Williamstown (Ky.).

HUNTLEY, L. G.

286a. Principles of oil and gas production: See Johnson, R. H., and Huntley, L. G.

HUSSAKOF, L.

287. Descriptions of four new Paleozoic fishes from North America: Am. Mus. Nat. Hist. Bulletin, vol. 32, pp. 245-250, 1 pl., 2 figs., 1913.

HUTCHINSON, F. M.

288. Coals in the Central City, Madisonville, Calhoun and Newburg Quadrangles of the western coal field: Kentucky Geol. Surv., Report Progress, 1908-9, pp. 54-69, 1910.

289. Geology and coals of the Central City, Madisonville, Calhoun and Newberg Quadrangles: Kentucky Geol. Surv., Bulletin No. 19, 127 pp., 4 maps, 6 sections, 1912.

290. Preliminary report on oil and gas possibilities in the Newberg, Calhoun, Central City and Madisonville Quadrangles, including a discussion of the primary factors governing such accumulations: Kentucky Geol. Surv., Report Progress 1908-9, pp. 85-92, 1910.

IMLAY, G.

291. A Topographical Description of the Western Territory of North America, etc. Samuel Campbell, Pub., New York, 1793. (Transylvania University Lib.)

291a. Early descriptions of Ky. climate, soil, topography and geological references, with map of Ohio River rapids at Louisville, etc., opp. p. 110.

JAMES, JOSEPH F.

292. Evidences of beaches in the Cincinnati group: Science, vol. 5, pp. 231-233, 1885. Reference to Kentucky.

293. Brief history of the Ohio River, A: Pop. Sci. Monthly, vol. 38, pp. 739-748, 1891.

294. On the age of the Point Pleasant, Ohio, beds: Cin. Nat. Hist. Journ., vol. 14, pp. 23-104, plates, 1891. Reference to Kentucky.

JEFFREY, E. L.

294a. On fossil plants showing structure from base of Waverly shale of Kentucky: See Scott, D. H., and Jeffrey, E. L.

JILLSON, WILLARD ROUSE.

295. The Migration of the Headwaters Divide Right Middle Creek, Floyd County, Kentucky. American Journal of Science, Vol. XLVII, January, 1919; pp. 60-64. Also Department of Geology and Forestry of Kentucky, Series V, Mineral and Forest Resources of Kentucky. Vol. I, No. 2, Paper No. 7, pp. 105-109, July, 1919.

296. The Used and Unused Natural Gas Fields of Eastern Kentucky and their Relation to the Present and Future Public Service Demands. Louisville Herald, February 16, 1919. Also the Oil World, Vol. 2, No. 40, 6 pp., March 1, 1919.

297. The Oil and Gas Industry of Kentucky. The Encyclopedia Americana, New Edition, Vol. 16, pp. 371-372, 1919. Signed Article.

298. Sketch of the Development of the Oil and Gas Industry in Kentucky during the past Century, 1819-1919. Department of Geology and Forestry of Kentucky, Series V, Mineral and Forest Resources of Kentucky, Vol. I, No. 1, Paper I, 1919.

299. The Used and Unused Natural Gas Fields of Eastern Kentucky and Their Relation to the Present and Future Public Service Demands (Revised to April 1, 1919). Department of Geology and Forestry of Kentucky, Series V, Mineral and Forest Resources of Kentucky, vol. I, Paper No. 2, 1919.

300. A Bibliography of Kentucky Petroleum, Natural Gas, Asphalt and Oil Shale, Department of Geology and Forestry of Kentucky, Series V, Mineral and Forest Resources of Kentucky, Vol. I, No. I, Paper No. 3, 1919.

301. Structural Deformation and Its Relation to Proven Oil and Gas Accumulation in Eastern Kentucky. Department of Geology and Forestry of Kentucky, Series V, Mineral and Forest Resources of Kentucky, Vol. I, No. 2, Paper No. 1, 1919.

302. The Status of the Mauch Chunk in the Southeastern Part of Kentucky as a Producer of Petroleum and Natural Gas. Department of Geology and Forestry of Kentucky, Series V, Mineral and Forest Resources of Kentucky, Vol. I, No. 2, Paper No. 4, 1919.

303. The Kendrick Shale—A New Calcareous Fossil Horizon in the Coal Measures of Eastern Kentucky. Department of Geology and Forestry of Kentucky, Series V, Mineral and Forest Resources of Kentucky, Vol. I, No. 2, Paper No. 6, 1919.

304. Low Sulphur Coals of Kentucky. Department of Geology and Forestry of Kentucky. Series V, Mineral and Forest Resources of Kentucky, Vol. I, No. 2, Paper No. 8, 1919. Also A. I. M. M. E. Bull. 153, September, 1919.

305. The New Oil and Gas Pools of Allen County. Department of Geology and Forestry of Kentucky, Series V, Mineral and Forest Resources of Kentucky, Vol. I, No. 2, Paper No. 10, July, 1919. Also The Oil World (Lexington, Kentucky), Vol. 3, No. 11, pp. 2, 3, 6 and 7, August 16, 1919. Also

(Abstracted) The Courier-Journal, Louisville, Kentucky, Vol. CXXXI, New Series, No. 18, 491, Section I, Paper 3 (4 illustrations), Sunday, August 17, 1919. Also National Petroleum News, October 1, 1919, pp. 67-76, and one map.

306. The Oil and Gas Resources of Kentucky. Department of Geology and Forestry of Kentucky, Series V, Bull. I, green linen binding, 630 pp., 1919, First Edition 3,000.

307. The 1919 Oil Output in Kentucky. Petroleum Magazine (Steger Building, Chicago, Illinois), Vol. VII, No. 3, pp. 154, July, 1919.

308. A Bibliography of the Coals of Kentucky. Department of Geology and Forestry of Kentucky, Series V, Mineral and Forest Resources of Kentucky, Vol. I, No. 3, 1919.

309. The Production of Coal in Kentucky, Department of Geology and Forestry of Kentucky, Series V, Mineral and Forest Resources of Kentucky, Vol. I, No. 3, 1919. Also Louisville Courier-Journal, Sunday Magazine Section, Vol. CXXXI, New Series, No. 18, 603, pp. 8, 9 and 12, 8 illustrations, December 7, 1919.

310. Kentucky Petroleum—Its History and Present Status, Kentucky State Historical Society, The Register, Vol. 17, No. 51, pp. 45-49, September, 1919.

311. The Oil and Gas Geology of Breathitt and Knott Counties. Department of Geology and Forestry of Kentucky, Series V, Mineral and Forest Resources of Kentucky, Vol. I, No. 3, 1919.

312. The Re-born Oil Fields of Kentucky. Kentucky State Historical Society, The Register, Vol. XVIII, No. 52, pp. 33-43, 5 pls., January, 1920. Also, Louisville Courier-Journal, Sunday Magazine Section, Vol. CXXXI, New Series No. 18, 554, pp. 8, 9, 14 and 15, and 12 illustrations, October 19, 1919, also Petroleum (monthly), Vol. VIII, also No. 2, pp. 79, 80, 83, 177, 178, December, 1919.

313. Pay Oil Sands of Eastern Kentucky. Department of Geology and Forestry of Kentucky, Series V, Mineral and Forest Resources of Kentucky, Vol. I, No. 3, 1919.

314. The Wier Sand—A Newly Recognized Oil Horizon in Eastern Kentucky. Department of Geology and Forestry of Kentucky, Series V, Mineral and Forest Resources of Kentucky, Vol. I, No. 3, 1919.

315. The New Oil and Gas Pools of Warren County, Kentucky. Department of Geology and Forestry of Kentucky, Series V, Mineral and Forest Resources of Kentucky, Vol. I, No. 3, 1919.

316. Map Packet, 1919. Department of Geology and Forestry of Kentucky, Series V. Contains 8 maps. The following 4 were prepared by W. R. Jillson: (1) Oil and Gasc Pools and Pipe Lines of Kentucky (small scale); (2) Oil and Gas Map of Warren County (Scale, 1 inch equals 2 miles); (3) Kentucky-Appalachian Oil and Gas Fields (Small scale); (4) Geologic Map of Kentucky (small scale).

317. The Oil and Gas Resources of Kentucky. Author's Edition. (Second Editon.) Blue cloth and gold. Autographed cover, 630 pp., 1919. State Journal Press.

318. A Mauch Chunk Island in the Mississippian Seas of Eastern Kentucky. Abstract Science, 1920. Paper presented before Geol. Sc. Am. Assn. Adv. Sc., Dec. 30, 1919, St. Louis. Refers to Structural Geology of Johnson and Magoffin Counties, Ky.

319. Kentucky Leads in Local Deposits of Material for Road Building. Lexington Herald, Monday, April 26, 1920, and Tuesday, May 18, 1920. Discusses Deposits of Rock Asphalt in Kentucky.

320. The Possible Nucleus of a New Kentucky Oil Pool—Western Green County. The Oil World, Vol. 3, No. 52, June 5, 1920. Lexington Herald, No. 151, May 30, 1920.

321. Contributions to Kentucky Geology. Department of Geology and Forestry of Kentucky. Series V, Bull. IV, linen bound, 266 pp., edition 2,000, 1920. This book is a compiled reprint of all of the shorter separate reports written by the State Geologist during 1919 and published in the serial, Mineral and Forest Resources of Kentucky. Fifteen separate papers and reports are included.

322. River and Forest Trails in Western Kentucky. The Louisville Courier-Journal, Louisville, Kentucky, Vol. CXXXII, New Series No. 18, 862, Sunday Mag. Section, pp. 8, 9, 15. Eight illustrations. Aug. 22, 1920.

323. Geologic Map of Kentucky. The Kentucky Geological Survey, Series VI, Edition of 2,000. Scale, 1 inch equals 10 miles. Areal geology shown in standard colors, oil and gas pools and pipe lines; Eastern and Western Coal Fields. Oct. 1, 1920.

324. The Oil and Gas Resources of Kentucky. Kentucky Geological Survey, Series VI. Completely revised reprint of Series V, Bull. No. 1, green linen binding, 630 pp., Third edition 3,000. 1920.

325. Geological Problems in the Recovery of Oil and Gas in Kentucky. Bull. Am. Assn. Petroleum Geologists. Vol. 4, No. 3, pp. 303-312.

326. Economic Papers on Kentucky Geology. Kentucky Geological Survey, Series VI, Vol. II. Blue cloth and gold. Contains the following separate papers, and reports. (37 to 50 inclu.) front and index only.

327. A Preliminary Report on the Oil Shales of Kentucky, Ky. Geol. Survey, Series VI, Vol. II.

328. Kentucky Rock Asphalt—The Ideal Road Surface, Ky. Geol. Survey, Series VI, Vol. II.

329. Geological Problems in the Recovery of Oil and Gas in Kentucky. Revised Reprint from Bull. Am. Assn. Petroleum Geologists, Vol. 4, No. 3, pp. 303-312. 1920. Also Ky. Geol. Survey, Series VI, Vol. II.

330. The Production of Kentucky Crude Oil. Ky. Geol. Survey, Series VI, Vol. II.

331. The Value and Direction of State Geological Surveys. Ky. Geol. Survey, Series VI, Vol. II.

332. River and Forest Trails in Western Kentucky. Ky. Geol. Survey, Series VI, Vol. II.

333. The Ultimate Source of Kentucky Crudes. Ky. Geol. Survey, Series VI, Vol. II.

334. Produciton of Fluorspar in Western Kentucky. Ky. Geol. Survey, Series VI, Vol. II.

335. Geology of Oil and Gas in Grayson County. Ky. Geol. Survey, Series VI, Vol. II.

336. A Mauch Chunk Island in The Mississippian Seas of Eastern Kentucky. Original paper from which No. 28 was abstracted. Ky. Geol. Survey, Series VI, Vol. II.

337. The Sandy Hook Anticline—A Newly Discovered Oil and Gas Structure in Elliott County, Ky. Ky. Geol. Survey, Series VI, Vol. II.

338. The Campbellsville Anticline in Taylor County, Ky. Ky. Geol. Survey, Series VI, Vol. II.

339. Paint Creek-Pirate. Ky. Geol. Survey, Series VI, Vol. II.

340. Oil Shales of Kentucky. Read before Annual Conv. Am. Assn. Petroleum Geologists Tulsa, Okla., Feb. 18, 1921. Pub. by Louisville Courier-Journal, Sunday Magazine section, Vol. CXXXIII, New Series No. 19, 107, pp. 7-12, 3 illustrations, Sunday, April 24, 1921, also Oil News, Vol. 10, No. 3, Feb. 5, 1922, Galesburg, Ill., pp. 36-37.

341. The Production of Eastern Kentucky Crude Oils. Cumberland Pipe Line Co., pub. State Journal Co., printer, Frankfort, Ky. Dated April 15, 1921. Edition partly in full red leather and gold, and partly white paper cover. 100 pp., map two colors.

342. A History of the Kentucky Geological Survey. The Register of the Kentucky State Historical Society, Vol. 19, No. 57, Sept., 1921, pp. 90-112, 3 portrait pls. includ., frontispiece.
343. The Sixth Geological Survey, Kentucky Geological Survey, Series VI, Vol. VI (Administrative Report). Blue cloth and gold. Dec., 1921.
344. Geology and Coals of the Middle Fork of the Kentucky River near Buckhorn in Perry and Breathitt Counties, Ky., Geological Survey. Series VI, Vol. VI, No. III. Dec., 1921.
345. A New Method of Producing Crude Oil in Kentucky. Ky. Geol. Survey, Series VI, Vol. VI, No. V, Dec. 1921; also Petroleum World (Los Angeles, Cal.), Vol. VII, No. 4, pp. 4, 22 and 24; 2 plates, April, 1922.
346. Oil and Gas Possibilities of "The Jackson Purchase" Region. Ky. Geol. Survey, Series VI, Vol. VI, No. VII. Dec., 1921.
347. Drainage Problems in Kentucky. Ky. Geol. Survey, Series VI, Vol. VI, No. IX. Dec., 1921.
348. Recent Mineral Production in Kentucky. Ky. Geol. Survey, Series VI, Vol. VI, No. X, Dec., 1921. Also Lexington (Ky.) Herald, Anniversary Section, p. 9, No. 29. Sunday, Jan. 29, 1922.
349. The Region About Frankfort. Ky. Geol. Survey, Series VI, Vol. VI, No. XI. Dec., 1921.
350. A History of the Coal Industry in Kentucky. Register of the Kentucky State Historical Society, Vol. 20, No. 58, pp. 21-45, 5 photo. illus., Jan, 1922. Also a short excerpted article Louisville Herald, Vol. LXXXIX, No. 136, Part IV, p. 14-D. Sunday, Nov. 13, 1921.
351. The Conservation of Natural Gas in Kentucky. 44 Photographs, Maps and Diagrams, 152 pp., 1st edition, blue cloth and gold. John P. Morton & Co., Louisville, Ky. Jan. 1922.
352. The Coal Industry in Kentucky, 10 photo illus., 1 map, 87 pp. black cloth and gold. (No. 350 revised and expanded.) The State Journal Co., Frankfort, Ky. Jan. 1922.
353. Thoughts on Evolution. Lexington (Ky.) Herald. 52d yr. No. 39, p. 5, 2 cols. Feb. 8, 1922. Also printed as a separate by The State Journal Co., Frankfort, Ky. 1922. Relation of evolution to geology in Kentucky.
354. Oil Field Stratigraphy of Kentucky. 35 photographs, maps, and diagrams. 738 pp. Ky. Geol. Survey, Series VI, Vol. III. Blue cloth and gold. May, 1922.
355. Oil and Gas in the Big Sandy Valley. Ashland Daily Independent. Vol. XXVII, No. 103, p. 13, Thursday evening, Apr. 27, 1922; also Ky. State Historical Society, The Register, Vol. 20, No. 59, pp. 191-193, May, 1922.

356. The Discovery of Kentucky. 1 map, 13 pp., Ky. State Historical Society, The Register, Vol. 20, No. 59, pp. 117-129, May, 1922. References to mountain topography of Eastern Kentucky.

357. First Explorations of Daniel Boone in Kentucky. 2 photo. plates, 3 pp., Ky. State Historical Soc., The Register, Vol. 20, No. 59, pp. 204-206, May, 1922. References to Salt Spring in Floyd County, Ky.

358. Carbon black industry in Kentucky. The Pan-American Geologist, Vol. XXXVIII, No. 1, p. 18, Aug. 1922.

359. Coal fields of Kentucky. The Pan-American Geologist, Vol. XXXVIII, No. 1, 88-89 pp., Aug. 1922.

360. The Big Sandy Valley. A regional history prior to 1850. 1 pl. map, pp. 227-259. Ky. State Historical Soc., The Register, Vol. 20, No. 60, Sept. 1922. Presents a sketch of the historical geology of this region.

361. An Historical Sketch of the Kentucky Geological Survey, 1838-1922, Pub. as a chapter in the History of Kentucky. Chas. Kerr, Editor, American Historical Society, Chicago, and New York City, 1922. A brief review of the work of the six geological surveys in Kentucky with references to geology of the State.

362. New Oil Pools of Kentucky, illustrated. Kentucky Geological Survey, Series VI, Vol. XII, 1923. Locates, describes and maps several prospected and indexed oil and gas pools in Kentucky.

363. Geological Research in Kentucky, illustrated. Kentucky Geological Survey, Series VI, Vol. XV, 1923. A record of the activities of the several State Geological Surveys in Kentucky, a chronological presentation of every official survey, report and map, and a very complete and up-to-date bibliography on Kentucky geology, mineralogy, topography, soil, etc., of about 750 titles.

364. New fossil invertibrates from a new fossil horizon in the coal measures of Eastern Kentucky (abstract): Science, new ser., vol. 50, p. 95, July 25, 1919.

365. A bibliography of the several books, reports, papers, and maps relating to geology written and prepared by Willard Rouse Jillson: Kentucky Geol. Survey, Ser. VI, Pamphlet No. 1, 7 pp., 1920.

366. A Mauch Chunk Island in the Mississippian Seas of Eastern Kentucky (abstract): Science, new ser., vol. 51, p. 492, May 14, 1920.

367. The Big Sandy Valley. A regional history prior to 1850, 18 pp., illustrations, 1 map. John P. Morton & Co., Louisville, Ky., 1923. Presents an outline of the historical and stratigraphic geology of the eastern most part of Kentucky.

368. A bibilography of the Mammoth Cave of Kentucky. Ky. Geol. Survey, Series VI., Vol. X, pp. 149-153 1923.

369. The Mineral Resources of Kentucky. Kentucky Geological Survey, Series VI, Vol. XVII, illustrated, 1923. A complete statement of Kentucky's mineral production in volume and value with notes on the general geology of occurrence.

370. The Coal Industry in Kentucky. Kentucky Geological Survey, Series VI, Vol. 20 (No. 350 revised and greatly expanded), illustrated maps, etc., 1923. Historical sketch of industry of coal mining in Kentucky, general geology of the coals, and a list of all operators.

371. Emory River Overthrust of East Tennessee, the Pan-American Geologist, Vol. XXXIX, No. 5, pp. 373-378, pls. XXVIII, XXIX. (Map and illustrations). June, 1923. Refers to geology of the Pine Mountain region of Kentucky.

372. The Haddix-Coalburg Geosyncline. Science Vol. LVIII, No. 1497, p. 184, Sept. 7, 1923.

373. Land of Ten Thousand Sinks. Science, Vol. LVIII, No. 1497, p. 184, Sept. 7, 1923.

374. A Gigantic Slate Slide. Science, Vol. LVIII, No. 1497, p. 184, Sept. 7, 1923.

375. A New Tennessee Oil Pool. Pan-American Geologist, Vol. XL, No. 3, October 1923. Refers to geology of parts of Cumberland and Monroe Counties, Ky.

376. Geologic Map of Kentucky. The Ky. Geol. Survey. Series VI. Edition 2.000. Scale 1 inch equals 10 miles. A real geology in standard colors, fault systems, igneous dikes, major anticlines and eastern geosyncline, oil and gas pools and pipe lines, all coal operations, physiographic provinces. Oct. 1. 1923.

377. An Isothrustic Hypothesis. Pan-American Geologist, Vol. XL, No. 4, November, 1923. Refers to the structural geology of Kentucky and adjoining states.

377a. Unique Devonian Sandbar. Pan-American Geologist, XL., No. 5, Dec., 1923.

JILLSON, WILLARD ROUSE, and HODGE, JAMES M.

378. Geology and coals of Stinking Creek, Knox County, Ky.; Dept. of Geol. and Forestry of Kentucky, series V, Bulletin No. 3, 1919.

JOHNSON, R. H., and HUNTLEY, L. G.

379. Principles of oil and gas production: John Wiley and Sons, N. Y. City, 1916. Isolated references to Kentucky oil geology and production.

JONES, S. C.

380. Abstract from preliminary report of the soil survey of Kentucky: Kentucky Geol. Surv., Report Progress, 1908-9, pp. 22-35, 1910.

380a. Soils of Franklin County: Kentucky Agr. Exp. Sta., Bulletin 195, 1915, and Kentucky Geol. Surv., Geology of Franklin County, pp. 95-114, 1914.

380b. Soils of Graves County: Kentucky Agr. Exp. Sta., Bulletin No. 194, 1915.

380c. Soils of Hartford Quadrangle: Kentucky Geol. Surv., Bulletin No. 20, pp. 26-33, 1912. (Supplementary to James Gardner's Report on the Economic Geology of the Hartford Quadrangle.)

380d. Soils of the eastern coal field and soils of Hartford Quadrangle: Kentucky Geol. Surv., series 4, vol. 1, part 2, pp. 1067-1187, 1913.

380e. Soils of Webster County: Kentucky Agr. Exp. Sta., Bulletin No. 162, pp. 135-169, map, 1912.

KENNEDY, WILLIAM.

380f. Texas clays and their origin: Sci., vol. 22, pp. 297-300, 1893. Chemical analyses of some Kentucky clays included.

KIMBALL, J. P.

380g. Genesis of iron ores by isomorphous and pseudomorphous replacement of limestone: Am. Gel., vol. 8, pp. 352-376, 1891. Reference to Kentucky.

KINDLE, EDWARD M.

380h. Contributions to Devonian paleontology: See Williams, Henry Shaler, and Kindle, E. M.

380i. Devonian and Lower Carboniferous faunas of southern Indiana and central Kentucky: Am. Pal. Bulletin, No. 12, 112 pp., 1899.

380j. Iron ores of Bath County, Kentucky: U. S. Geol. Surv., Bulletin No. 285, pp. 180-182, 1906.

380k. Unconformity at the base of the Chattanooga Shale in Kentucky: Am. Journ. Sci., 4th series, vol. 33, pp. 120-136, 3 figs., 1912.

381. Unconformity at the base of the Onondaga limestone in New York, and its equivalent west of Buffalo: Journ. Geol., vol. 21, No. 4, pp. 301-309, 8 figs., 1913. Reference to Kentucky.

KING, W. R.

382. Surface Waters of Kentucky, illustrated. Kentucky Geol. Surv., Series VI, Vol. XIV, 1923.

KINGSLEY, J. S.

383. Caves and cave life: Am. Nat., vol. 22, pp. 1104-1106, 1888. Reference to Kentucky.

KNOTT, W. T.

384. Report on the geology of Marion County: Kentucky Geol. Surv., 43 pp., 1889.

KUNZ, GEORGE F.

385. On Two Meteorites from Carroll County, Ky., and Catorze, Mexico, March, 1887, 8 pl. Am. Journ. Sci. XXXIII, March, 1887. See also items 120-126.

LANE, ALFRED C.

386. Report on certain lands leased for oil and gas near Cannel City, Morgan County, Kentucky: Private publicaton, 12 pp., Lansing, Mich., 1902.

LE COUPPEY DE LA FOREST, MAX.

387. Quelques grottes des Etats Unis d' Amerique: Spelunca, t. 35, No. 35, pp. 3 (117)-21 (135), 2 figs., 1904. Describes among others, Mammoth Cave and Colossal Cavern.

LEE WALLACE.

388. Shawneetown Quadrangle: Kentucky Geol. Surv., 73 pp., map, 1916.

LEITH, CHARLES K.

389. Economic Aspects of Geology, 457 pp. Henry Holt & Co., New York, 1921. Many references to Kentucky asphalt, coal, fluorspar, marble, petroleum, sandstone, etc.

LEONARD, WM. CLEMENT.

390. Facts Concerning the Kentucky Oil Fields, 12 pp. Pub. by Efficiency Service Co., 3536 Broadway, New York City, 1919.

LESLEY, JOSEPH P.

391. Note on a map intended to illustrate five types of earth surface in the United States between Cincinnati and the Atlantic: Am. Phil. Soc. Transactions, vol. 13, new series, pp. 305-312, 1869. Reference to Kentucky.

392. Note on Lesquereux's table of comparative sections of coal measures: Am. Journ. Sci., 2d series, vol. 32, pp. 281-285, 1861. Reference to Kentucky.

393. On the mode of existence of the petroleum in the eastern coal field of Kentucky, and description of associated formation: Am. Phil. Soc., Proc., vol. 10, pp. 33-68, 188-191, 1869.

394. On three comparative sections of the coal measures in Kentucky and in eastern and western Pennsylvania: Am. Asso. Proc., vol. 2, part 2, pp. 39-42, 1858.

395. Topographical and geological report of the western margin of the eastern (Ky.) coal field: Kentucky Geol. Surv., vol. 4, pp. 443-493, 1861.

LESQUEREUX, LEO.

396. Mode of preservation of vegetal remains in our American coal measures: Ill. Geol. Surv., vol. 4, Geology and Paleontology, pp. 478-508, Chicago, 1870. Reference to Kentucky.

397. On some questions concerning the coal formations of North America: Am. Journ. Sci., 2d Series, vol. 28, pp. 21-37, 1859. Reference to Kentucky.

398. On the fossil fruits found in connection with the lignites of Brandon, Vt.: Report on the geology of Vermont, vol. 2, pp. 712-713, Claremount, 1861. Reference to Kentucky.

399. Paleontological report—fossil flora and stratigraphic distribution of coal: Kentucky Geol. Surv., vol. 4, pp. 333-437, 1861. Abstract: Am. Journ. Sci., second series, vol. 32, pp. 119-122, 1861.

400. Paleontological report—fossil flora of the coal measures: Kentucky Geol. Surv., vol. 3, pp. 501-556, 1857. Abstract: Am. Journ. Sci., second series, vol. 26, pp. 110-112, 1858.

401. Report on the distribution of the geological strata in the coal measures of Indiana: Report of a geological reconnaisance of Indiana made in 1858-60, by R. Owen, pp. 273-341, Indianapolis, 1862. Reference to Kentucky.

402. Review of the fossil flora of North America, A: U. S. Geol. Surv.; F. V. Hayden in charge, Bulletin, vol. 1, 2d series, pp. 233-248, Washington, 1876. Reference to Kentucky.

403. Tertiary flora of North America: U. S. Geol. Surv. of Montana and portions of adjacent territories; Preliminary report, F. V. Hayden in charge, 5th Report of Progress, pp. 304-318, 1871. Reference to Kentucky.

LEVERETT, FRANK.

404. Cincinnati ice dam, The: Am. Geol., vol. 8, pp. 232-233, 1891. Reference to Kentucky.

LINNEY, WILLIAM M.

405. Geology of Spencer and Nelson Counties: Kentucky Geol. Surv., 58 pp., 1884 (?)

406. Notes on the rocks of central Kentucky, with list of fossils: Kentucky Geol. Surv., 19 pp. 1889(?)

407. Report of the geology of Bath and Fleming Counties: Kentucky Geol. Surv., 86 pp., map, 1886(?)

408. Report on the geology of Clark and Montgomery Counties: Kentucky Geol. Surv., 75 pp., map, 1887(?)

409. Report on the geology of Garrard County: Kentucky Geol. Surv., 31 pp., map. 1882.
410. Reports on geology of Henry, Shelby and Oldham Counties: Kentucky Geol. Surv., 70 pp. map, 1889(?)
411. Report on geology of Lincoln County: Kentucky Geol. Surv., 36 pp., map, 1882(?)
412. Report on the geology of Mason County: Kentucky Geol. Surv., 31 pp., map, 1885(?)
413. Report on the geology of Mercer County: Kentucky Geol. Surv., 29 pp., map, 1887(?)
414. Report on the geology of Washington County: Kentucky Geol. Surv., 24 pp., map, 1887(?)

LLOYD, JOHN URI.
415. Etidorpha, 386 pp., 64 illus. Robt. Clark Co., Cincinnati, 1896. A layman's description of the geology and topography of southwestern Kentucky from the Ohio River at Smithland to and including the Mammoth Cave region.

LOCKE, JOHN.
416. Report on southwestern Ohio: Geology of Ohio, by W. W. Mather, 2nd annual report, pp. 201-274, Columbus, 1838. Reference to Kentucky.

LOGAN, WILLIAM E., and HALL, JAMES.
417. Map of Canada and part of the United States: Montreal, 1866. Includes Kentucky.

LOUGHLIN, G. F.
418. Stone: U. S. Geol. Surv., Mineral Resources, part 2, No. 36, 90 pp., 2 figs., 1917.

LOUGHRIDGE, R. H.
419. Geology of Clinton County: Kentucky Geol. Surv., 48 pp., 1890(?)
420. Report on the geological and economic features of the Jackson Purchase region: Kentucky Geol. Surv., 357 pp., pls., 3 maps, 1888.

LOUNSBURY, CLARENCE.
420a. Soil Survey of Rockcastle County: See Burke, R. T. Avon, and Lounsbury, Clarence.

LYELL, SIR CHARLES.
421. On the geological position of Mastodon giganteum and associated fossil remains at Bigbone Lick, Kentucky, and other localities in the United States and Canada: Am. Journ. Sci., vol. 46, pp. 320-323, 1844, and Geol. Soc. London Proc., vol. 4, No. 92, 1844.

422. Second visit to the United States: 2 volumes; vol. 1, 273 pp., vol. 2, 287 pp., New York, 1849. Second edition, vol. 1, 268 pp., vol. 2, 385 pp., London, 1855. Third edition, London, 1855. Reference to Kentucky.

423. Travels in North America, 1841-2, with geological observations on the United States, Canada and Nova Scotia: 2 volumes; vol. 1, 255 pp., vol. 2, 221 pp., 7 pls., map. First edition, New York, 1845. Subsequent editions in English and German. Reference to Kentucky.

LYON, SIDNEY S.

424. Continuation from vol. 2 of topgraphic report of the progress of the survey of Kentucky, in the counties of Greenup, Carter, Lawrence and Hancock for the year 1857: Kentucky Geol. Surv., vol. 3, pp. 423-463, 1857.

425. Paleontological report—Crinoids: Kentucky Geol. Surv., vol. 3, pp. 467-498, 1857.

426. Remarks on the stratigraphical arrangement of the rocks of Kentucky from the Catenipora escharoides horizon of the Upper Silurian period, in Jefferson County, to the base of the productive coal measures in the eastern edge of Hancock County, Kentucky: St. Louis Acad. Sci., Trans., vol. 1, 612-621, 1860.

427. Remarks on thirteen species of crinoids from the paleozoic rocks of Indiana, Kentucky and Ohio: Am. Phil. Soc., Trans., vol. 13, new series, pp. 443-466, 1869.

428. Topographical and geological report—the tracing of the base line in 1858 and 1859: Kentucky Geol. Surv., vol. 4, pp. 501-599, 1861.

429. Topographical and geological report of that portion of Kentucky, including Union and part of Crittenden Counties, surveyed during the years 1854 and 1855: Kentucky Geol. Surv., pp. 381-400, 1856.

430. Topographical report: Kentucky Geol. Surv., vol. 3, pp. 425-463, 1857.

LYON, SIDNEY S.

431. Descriptions of Four New Species of Blastoidea from the Subcarboniferous Rocks of Kentucky. Trans. of the Academy of Sc. of St. Louis. Vol. 1, No. 4, pp. 628-634, 1 pl. (No. 20), date(?). (Private Lib. W. R. Jillson.)

LYON, VICTOR W.

432. Description of Three New Species of Calceolidae from the Upper Silurian Rocks of Kentucky. Acad. Nat. Sc. of Phil., pp. 43-46, May 26, 1879. (Priv. Liv. W. R. Jillson.)

McCALLIE, S. W.

433. Barboursville oil field, The: Eng. and Mining Journ., vol. 76, pp. 12-13, 1903.

McCREATH, ANDREW S., and D'INVILLIERS, E. V.

434. Resources of the Upper Cumberland Valley of southeastern Kentucky and southwestern Virginia tributary to the proposed Cumberland Valley extension of the Louisville and Nashville Railroad, 152 pp., map, Louisvlle, 1888.

MACFARLANE, GRAHAM.

435. Eastern coal regions of Kentucky: Am. Inst. Mining Engs., Trans., vol. 25, pp. 518-532, 5 figs., 1896.

MACFARLANE, JAMES.

436. An American geological railway guide, giving geological formations at stations, with altitudes, etc.: Collaborated with geologists in the various States, 426 pp., 2nd edition, New York, 1890. Includes Kentucky.

437. Coal regions of America, their topography, geology and development; xvi, 676 pp., 25 maps, latest edition, New York, 1877.

McGEE, W. J.

438. Appomattox formation on the Mississippi embayment: Abstract, Geol. Soc. Am. Bulletin, vol. 2, pp. 2-6, 1891. Reference to Kentucky.

439. Lafayette formation: U. S. Geol. Surv., Twelfth Annual Report, 1890-1. Reference to Kentucky on pages 415, 466-470 and 499-500.

440. Map of the United States, exhibiting the present status of knowledge relating to the areal distribution of geologic groups (preliminary compilation) 17¼x28 inches, U. S. Geol. Surv., accompanying 5th annual report for 1883-4, 1885. Includes Kentucky.

MACLURE, WILLIAM.

441. Observations on the geology of the United States, with remarks on probable effects of rock decomposition on nature and fertility of soils: Am. Phil. Soc. Trans., vol. 1, new series, 91 pp., map, pls., 1809. Reference to Kentucky.

MAREAN, HERBERT W.

442. Soil survey of Union County: U. S. Dept. of Agr., 1902.

MARSHALL, R. B.

443. Spirit levels in Kentucky for the years 1898-1913, inclusive: Kentucky Geol. Surv., series 4, vol. 2, part 2, pp. 203-354, 1914.

444. Spirit leveling in Kentucky, 1903-1914, inclusive: U. S. Geol. Surv., Bulletin 673, 100 pp., 1 pl., 1918.

MARCOU, JULES.

445. Geological map of the United States and British Provinces of North America (with explanatory text and geological sections): 92 pp., Boston, 1853. Reprinted later in Europe.

446. Geology of North America, etc., originally made for the United States Government: 144 pp., 3 maps, Zurich, 1858. Reference to Kentucky.

447. Ueber die Geologie der Vereinigten Staaten und der englishen Provinzen von Nord-America: Petermann's Mitt., vol. 1, pp. 144-159, map, 1855. Reference to Kentucky.

MARTEL, E. A.

448. Explications sur Mammoth Cave: Spelunca, t. 9, pp. 241-302, 1914.

MATHER, K. F., and SHAW, E. W.

449. The Oil Pools of Allen County, Ky., U. S. G. S., Bull. 688.

MATHER, WILLIAM WILLIAMS.

450. Report on the geological reconnaissance of Kentucky, made in 1838. (First preliminary. First geological work ever done in Kentucky prior to establishment of Ky. Geol. Surv.), 1839. Executive document, 1839. (Edition exhausted.)

451. Geological Examination of the Lands Through Which Passes the Lexington and Big Sandy Railroad, 15 pp. Pudney & Russell, Printers, No. 79 John St., N. Y., 1854. Rare. One copy Ky. Hist. Soc., Frankfort, Ky. Discusses mineral resources of Clark, Montgomery, Bath, Rowan, Carter, and refers to Kentucky River, Licking River, and Big Sandy River coals.

MATSON, G. C.

452. Water resources of the Bluegrass region of Kentucky, with chapter on quality of the waters by Chase Palmer: U. S. Geol. Surv., Water Supply Paper, No. 233, 223 pp., 3 pls., 6 figs., 1909.

MEASE, JAMES.

454. A Geological Account of the United States, 510 pp., illustrated. Birch and Small, Philadelphia, Pa., 1807. Many references to Kentucky geology, topography, soils, analyses, minerals, etc. (Pvt. Lib. W. R. Jillson).

MEEK, F. B.

455. Remarks on the Carboniferous and Cretaceous rocks of eastern Kansas and Nebraska, etc.: Am. Journ. Sci., 2nd series, vol. 39, pp. 157-174, 1865. Reference to Kentucky.

MERRILL, GEORGE P.

456. Collection of building and ornamental stones in the United States National Museum; catalogue: Smithsonian Inst. Report for 1886, part 2, pp. 277-648, plates, 1889. Reference to Kentucky.

457. Newly found meteorite from Mount Vernon, Christian County, Kentucky, A: Am. Geol., vol. 31, pp. 156-158, 1903.

458. On the formation of stalactites and gypsum incrustations in caves: U. S. Nat. Mus. Proc., vol. 17, pp. 77-81, 5 pls., 1895. Reference to Mammoth Cave.

459. Stones for building and decoration: 453 pp., New York, 1891. Reference to Kentucky.

460. Contributions to the History of American Geology: 189-734 pp., Government Printing Office, Washington, 1906. From the Report of the U. S. National Museum for 1904. 37 plates and 141 text figures. Reference to Kentucky.

461. The Cumberland Falls, Whitley County, Ky., Meteorite. (From the Proceedings of the United States National Museum, No. 2306, vol. 57, pp. 97-105, with plates 14-18.) 1921. Also Ky. Geol. Surv., series VI, vol. VI, paper No. II, pp. 35-51, 1921.

McCREATH, ANDREW S., and D'INVILLIERS, E. V.

461a. Mineral Resources of the Upper Cumberland Valley of Southeastern Kentucky and Southwestern Virginia, etc., 152 pp., 1 map. Courier-Journal Job Printing Co., Louisville, Ky., 1888. Describes geology of Harlan and Bell Counties, Ky.

MILLER, ARTHUR M.

462. Additional facts concerning the Bath Furnace meteoric fall of Nov. 15, 1902: Science, new series, vol. 18, pp. 243-244, 1903.

463. Antiquity of the Cincinnati Island: Science.

464. Association of the gastropod genus Cyclora with phosphate of lime deposits: Am. Geol., vol. 17, pp. 74-76, 1896.

465. Classification and mapping of the lower Ordovician of Kentucky: Abstract, Ohio Naturalist, vol. 6, No. 3, pp. 447-448, Jan., 1906.

466. Coals of the western border of the eastern coal field: Kentucky Geol. Surv., Bulletin No. 12, 83 pp., 7 pls. (maps and sections), 1910.

467. Evidence of the former connection between the eastern and western coal fields across central Kentucky: Geol. Soc. Am. Bulletin, vol. 20, pp. 621-624, 1 fig. (map) and reprint, 1908. Abstract, Science, new series, vol. 29, p. 624, April 16, 1909.
468. Faulting in north-central Kentucky: Geol. Soc. Am. Bulletin, vol. 27, No. 1, pp. 101-104, March 30, 1916.
469. Geography of Kentucky in Natural Advanced Geography, by Redway, J. W., and Hinman, Russell: American Book Co., pp. 1-12 in appendix, plates, maps (one geological), 1898. Reprinted in more complete form in fourteenth biennial report of the Bureau of Agr. of Kentucky for 1900-1901.
470. Geology of Fayette County: Report of Commissioner of Agriculture of Kentucky, pp. 93-94, 1901.
471. Geology of Franklin County: Kentucky Geol. Surv., series 4, vol. 2, part 3, 87 pp., 1914. Ibid., Soils of Franklin County, by S. C. Jones, on pp. 95-144.
472. Geology of the Georgetown Quadrangle: Kentucky Geol. Surv., series 4, vol. 2, part 1, pp. 317-386, 1913.
473. High-level gravel and loam deposits of Kentucky rivers: Am. Geol., vol. 14, pp. 281-287, 1895.
474. Hypothesis of a Cincinnati Silurian island: Am. Geol., vol. 22, pp. 7885, 1895.
475. Ice caves: Sci., new series, vol. 37, pp. 980-981, June 27. Contains a description of a "glaciere" in Wayne County, Ky.
476. Lead and zinc-bearing rocks of central Kentucky, with notes on the mineral veins: Kentucky Geol. Surv., Bulletin No. 2, 35 pp., 8 pls., 1 fig., 1905.
477. New meteorite (Bath Furnace), from Kentucky, A: Abstract, Eng. and Mining Journ., vol. 75, p. 154, 1903. Science, new series, vol. 17, p. 228, 1903. Sci. Am. Supplement, vol. 55, p. 22666, 1903.
478. Natural arches of Kentucky: Science, new series, vol. 7, pp. 845-846, 1 fig., June, 1898.
479. Discussion on "Fire Clays of the Eastern Coal Field of Kentucky." Journn. Am. Ceramic Soc., vol. 5, No. 8, p. 161, Aug., 1922.
480. Ordovician Cynthianan formation: Am. Journ. Sci., vol. 40, art. 47, pp. 651-657, and reprint, Dec., 1915.
481. Phosphate deposit possibilities of the Devonian black shale in Kentucky: Inspector of Mines' Report for Kentucky, pp. 307-314, 1895.
482. Some historic fish remains (from Vanceburg, Kentucky): Paper read at Kentucky Acad. of Sci. meeting, May, 1916. Abstract, Science, new series, vol. 44, pp. 71-72, July 14, 1916.

483. Table of geological formations for Kentucky: Univ. Book Store, Lexington, Ky., pp. 7, 1917.

484. Ultimate analyses of some Kentucky coals with calculation of their theoretical number of heat units: Inspector of Mines' Report for Kentucky, pp. 235-242, 1895.

485. Licks and caves of the Lower Ohio Valley as Repositories of Mammalian Remains, including those of man, pp. 157-159. Bull. Geol. Soc. Am., vol. 33, 1921.

485a. Recent Cave Explorations in Kentucky for Animal and Human Remains. Ky. Geol. Survey, Series VI, vol. X, pp. 107-113, Frankfort, 1923.

MILLER, S. A.

486. North American geology and paleontology for use of amateurs, students and scientists: 604 pp., Cincinnati, 1890. Reference to Kentucky.

487. North American Mesozoic and Cenozoic geology and paleontology: Cin. Soc. Nat. Hist. Journ., vol. 2, pp. 140-161, 223-244, 1879; vol. 3, pp. 9-32, 79-118, 165-202, 245-288, 1880; vol. 4, pp. 3-46, 93-144, 183-234, 1881. Also issued in work of 338 pp., Cincinnati, 1881. Reference to Kentucky.

488. Remarks on Trenton rocks of Lexington and Highbridge, Kentucky: Cin. Soc. Nat. Hist. Journ., vol. 3, p. 73, 1880.

488a. Recent Cave Explorations in Kentucky for Animal and Human Remains. Ky. Geol. Survey, Series VI, Vol. X, pp. 107-113. 1923.

MILLER, S. A., and Faber, C. L.

489. Description of some Subcarboniferous and Carboniferous cephalopoda: Cin. Soc. Nat. Hist. Journ., vol. 14, pp. 164-168, 1892. Some of the species described are from Kentucky.

MILLER, S. A., and GURLEY, F. E.

490. New species of crinoids, cephalopods and other Paleozoic fossils: Illinois State Museum Nat. Hist. Bulletin, No. 12, 69 pp., 5 pls., 1897. Some of the species described are from Kentucky.

MILLER, S. A., and others.

491. Report of the committee on geological nomenclature (Cincinnati group): Cin. Soc. Nat. Hist. Journ., vol. 1, pp. 193-194, 1879. Am. Journ. Sci., 3d series, vol. 17, pp. 484-485, 1879. Geol. Surv. Indiana, 8th, 9th and 10th Annual Reports, with lists of fossils, pp. 22-56, Indianapolis, 1879. Reference to Kentucky.

MITZAKIS, MARCEL.

492. Oil Encyclopedia, 551 pp., John Wiley & Sons, New York, 1922. Brief presentation of Ky. Oil Geol. and Production, pp. 270-272.

MOORE, ELWOOD S.

493. Coal: Its properties, analysis, classification, geology, extraction uses and distribution, 462 pp., illustrated. John Wiley & Sons, New York, 1922. Summary statement, p. 377; also Ky. cannel, p. 90.

MOORE, LUCAS.

494. Twelfth Biennial Report of the Bureau of Argiculture, Labor and Statistics of the State of Kentucky, 412 pp., 119-page county maps. Geo. G. Fetter Printing Co., Louisville, 1897. Separate descriptions of each Ky. county, including statement concerning the topography and mineral resources.

MOORE, P. N.

495. Geology of Hancock County: Kentucky Geol. Surv., pp. 389-421, 1878, and vol. D (Reports on western Coal field), 1884.

496. Geology of the Nolin River District, embracing portions of Grayson, Edmonson, Hart and Butler Counties: Kentucky Geol. Surv., pp. 79-134, 1877; and vol. D (Reports on western coal field), pp. 3-55, 1884.

497. Iron ores of Greenup, Boyd and Carter Counties: Kentucky Geol. Surv., vol. C (eastern coal field), pp. 81-156, 1884.

498. Iron manufacture of the Kentucky division of the Hanging Rock region: Ibid., pp. 157-196.

499. Iron ore and iron manufacture of the Kentucky-Red River region: Ibid., pp. 213-245.

500. Report on the iron ore of Cumberland Gap region: Ibid., pp. 245-258.

501. On the geology of a portion of the upper Cumberland River Valley in Bell and Harlan Counties: Kentucky Geol. Surv., Report of Progress, vol. 4, new series, pp. 445-453, 1878.

502. On the geology of the region adjacent to the eastern border of the western coal field, from the Louisville, Paducah and Southwestern Railway to the Ohio River: Kentucky Geol. Surv., Report of Progress, vol. 4, new series, pp. 389-421, 1878.

503. Report on the geology of a section from near Campton in Wolfe County to mouth of Troublesome Creek in Breathitt County: Kentucky Geol. Surv., pp. 255-284, 1878, and in vol. C, pp. 254-289, 1884.

504. Report on the geological reconnaisance of the region adjacent to the Virginia and Kentucky State line, from Cumberland Gap to Chatterawha or Big Sandy River: Kentucky Geol. Surv., Report of Progress, vol. 4, new series, pp. 217-240, 1878.

505. Report upon the Airdrie Furnace property: Kentucky Geol. Surv., part 4, vol. 2, second series, and reprint, Dec. 1877. Also appears on pp. 71-96, in vol. D, Western Coal Field, 1884.

MORRIS, MARSHALL.

506. Kentucky bituminous rock: Eng. and Mining Journ., vol. 43, p. 46, 1897.

MORSE, W. C., and FOERSTE, AUGUST F.

507. The Waverlian formations of east-central Kentucky and their economic values: Kentucky Geol. Surv., Bulletin No. 16, 76 pp., 5 figs., 1912.

MUNN, M. J.

508. Cumpton oil pool: U. S. Geol. Surv., Bulletin No. 471, pp. 9-17, 2 pls., 1912.

509. Menifee gas field and the Ragland oil field, Kentucky: U. S. Geol. Surv., Bulletin No. 531, 20 pp., 4 pls. (maps and sections), 1913.

510. Oil and gas development in Knox County, Kentucky: U. S. Geol. Surv., Bulletin No. 471, pp. 18-29, 2 pls. (map and sections), 1912.

511. Oil and gas fields of eastern and south-central Kentucky: Kentucky Geol. Surv., Report of Progress, 1908-9, pp. 92-94, 1910.

512. Reconnaissance of oil and gas fields in Wayne and McCreary Counties: U. S. Geol. Surv. Bulletin No. 579, 105 pp., 6 pls., 6 figs., 1914. Also Journ. of Washington Acad. of Science, vol. 15, 1915.

NELSON, N. C.

513. Kentucky and her cave men: Am. Mus. Journ., vol. 17, No. 4, pp. 221-223, illustrations, April, 1917.

NETTLEROTH, HENRY.

514. Kentucky fossil shells of the Silurian and Devonian rocks of Kentucky: Monograph of the Kentucky Geol. Surv., 300 pp., 36 pls., 1889.

NEWBERRY, J. W.

515. Geology of the oil regions of the United States: Am. Nat., vol. 10, pp. 316-317, 1876. Reference to Kentucky.

516. Mineral oil prospectus of the Indian Creek and Jack's Knob, Cumberland and Clinton Counties, Kentucky, coal, salt, oil, etc., company, with a geological report on the lands: 20 pp., Cincinnati, 1866.

NEWTON, HENRY.

517. Ores of iron, their geographical distribution and relation to great centers of the world's iron industries: Am. Inst. Mining Engrs. Trans., vol. 3, pp. 360-391, 1875. Reference to Kentucky.

NICKLES, J. M.

518. The upper Ordovician rocks of Kentucky and their Bryozoa: Kentucky Geol. Surv., Bulletin No. 5, 64 pp., 3 pls., 1905.

NICKLES, JOHN M.

519-523. Bibliography of North American Geology: U. S. Geol. Surv. Bull. 645, 1915; Bull. 665, 1916; Bull. 684, 1917; Bull. 698, 1918; Bull. 731, 1919-1920. List all accepted articles or books relative to Kentucky published during the years indicated above.

NOE, ADOLPH CHARLES.

523a. The Flora of the Western Kentucky Coal Field. Ky. Geol. Survey, Series VI, Vol. X, pp. 127-148. 1923.

NORTHRUP, J. D.

524. Asphalt, related bitumens and bituminous rock: U. S. Geol. Surv., Mineral Resources, part 2, No. 18, 21 pp., 1917.

NORWOOD, C. J.

525. Geology of a part of Ohio County: Kentucky Geol. Surv., vol. 5, part 5, second series, pp. 77-124, 1880. Reprinted in vol D, reports of the western coal field, 1884, and issued as a separate.

526. Ninth Annual Report of the Inspector of Mines of the State of Kentucky: Oct. 10, 1892, 283 pp., State Dept. of Mines, 1892. Production figures on coal and references to geology.

527. Kentucky s mineral wealth: Inspector of Mines' Report for Kentucky for 1901-2, pp. 297-434, 1903.

528. Kentucky's mineral wealth: Inspector of Mines' Report of Kentucky, pp. 243-307, 1895.

529. Keys to the coal fields: Inspector of Mines' Report for Kentucky, pp. 89-130, 1893. Includes reports by Geo. Gibbs and matter from some of Professor Crandall's reports.

530. Reconnaissance report on the lead region of Henry County, with some notes on Owen and Franklin Counties: Kentucky Geol. Surv., part 7, vol. 2, second series, 32 pp., 1875.

531. Report of examinations made along the paths of north and south running railroads in western Kentucky, A: Kentucky Geol. Surv., Reports of progress, vol. 4, new series, pp. 285-337, 1878.

532. Report on a Reconnaissance of the proposed line of railroad from Livingston station to Cumberland Gap: Kentucky Geol. Surv., part 6, vol. 2, second series, and reprint, 43 pp., 1 pl., 1875.

533. Report on the geology of the region adjacent to the Louisville, Paducah and Southwestern Railway, with a section: Kentucky Geol. Surv., Reports of progress, vol. 1, new series, pp. 355-448, pls., 1876.

534. Report on the progress of the Survey for the years 1904 and 1905: Kentucky Geol. Surv., 56 pp., 1905.

535. Report of the progress of the Geological Survey of Kentucky for the years 1906 and 1907: Kentucky Geol. Surv., 88 pp., 1908.

536. Report on the progress of the Kentucky Geological Survey for the years 1908 and 1909: Kentucky Geol. Surv., 127 pp., 1 pl., 1910.

537. Report on the progress of the Survey for the years 1910 and 1911: Kentucky Geol. Surv., 38 pp., 1 pl., 1912.

538. Report on a Reconnaissance in the lead region of Livingston, Crittenden and Caldwell Counties, including a sketch of their general wealth: Kentucky Geol. Surv., Reports of progress, vol. 1, new series, pp. 449-493, 1876.

539. Report of a Reconnaissance of a part of the Breckinridge cannel coal district: Kentucky Geol. Surv., vol. D, Reports on the western coal field, pp. 193-212, 1884.

540. Steam tests of coals: Inspector of Mines' Report for Kentucky, pp. 208-217, 1895.

541. Western Kentucky coal field: Supplement to the Bee, Earlington, Kentucky, pp. 1-5, 1 fig. (portrait of the author), April 14, 1910.

542. Kentucky Coal Mines: Output for year 1917, 18 pp., State Department of Mines, paper pamphlet, 1918. Detailed figures on the production of coal in Kentucky for the year 1917.

NORWOOD, J. G.

542a. Researches among the Protozoic and Carboniferous rocks of central Kentucky, etc.: See Owen, David Dale, and Norwood, J. G.

NUTTALL, THOMAS.

543. Observations on the geological structure of the valley of the Mississippi: Phila. Acad. Sci. Journ., vol. 2, part 1, pp. 14-52, 1821. Contains reference to Kentucky.

ORTMANN, ARNOLD E.

544. The systematic position of Crangopsis vermiformis (Meek), from the Sub-carboniferous rocks of Kentucky: Am. Journ. Sci., 4th series, vol. 4, pp. 283-289, 1897.

ORTON, EDWARD, SR.

545. Correlation of the lower coal measures of Ohio and eastern Kentucky: Am. Asso. Adv. Sci., Proc., vol. 33, pp. 398, 1885.

546. New horizons of oil and gas in the Mississippi Valley: Abstract, Am. Asso. Adv. Sci., Proc., vol. 37, pp. 181-182, 1889.

547. Petroleum, natural gas and asphalt rock in western Kentucky: Kentucky Geol. Surv., 233 pp., map, April, 1891.

548. Review of the stratigraphical geology of eastern Ohio: 34 pp., 1 pl., Columbus, 1880. Abstract, Am. Journ. Sci., 3 series, vol. 20, pp. 333, 1880. Reference to Kentucky.

OWEN, DAVID DALE.

549. On the geology of the Western States of North America: Geol. Sci. Quarterly Journ., vol. 2, pp. 433-447, with a geological chart of the Ohio Valley, 1846. Includes Kentucky.

550. Vol. 1, Kentucky Geol. Surv., General Report treating on Quaternary deposits, western and eastern coal fields, iron ores, Sub-carboniferous limestone, "The Barrens," Sub-carboniferous sandstone, black ligula shale, coralline falls limestone, chain coral magnesian limestone, blue shell limestone and marl, milk sickness: pp. 15-248, 1856.

551. Vol 2: Kentucky Geological Survey: 1857. Contents:
General report and agri. geology, pp. 5-51.
Chemical and economic geology, pp. 53-83.
Stratigraphic geology, pp. 85-114, treating of the geology of the counties of Daviess, Meade, Hardin, Breckinridge, Bullitt, Jefferson, Oldham, Trimble, Carroll, Owen, Gallatin, Boone, Kenton, Campbell, Pendleton, Harrison, Scott and Franklin.
Chemical report, pp. 119-300.
Topographic report, pp. 309-376.

552. Vol. 3: Kentucky Geological Survey: 1857. Contents:
Coal measures, pp. 9-30.
Agricultural geology, pp. 32-50.
Chemical geology, pp. 51-58.
Stratigraphic geology, including reports on 47 counties.

553. Vol. 4: Kentucky Geological Survey: 1861. General report, pp. 7-37. Other contributions by various authors listed elsewhere in this bibliography.

OWEN, DAVID DALE, and NORWOOD, J. G.

554. Researches among the Protozoic and Carboniferous rocks of central Kentucky, etc.: 1846. Abstract, Am. Journ. Sci., 2nd series, vol. 5, pp. 268-269, 1846.

PAGE, WILLIAM BYRD.

555. Description of the topography of the area included within the reconnaissance triangulation of the U. S. Coast Surv., in Kentucky during the seasons 1876 and 1877: Kentucky Geol. Surv., vol. 5, part 5, second series, 1880.

PALMER, CHASE.

555a. Water resources of the Bluegrass region of Kentucky, with chapter on the quality of the waters. See Matson, G. C., and Palmer, Chase.

PECK, W. R., and SAMPSON, R. J.

556. Harlan coal field in Kentucky, The: Coal Age, vol. 3, No. 21, pp. 796-800, 3 figs., 1 map, May 24, 1913.

PECKHAM, S. F.

557. Geological occurrence of bitumens, The: Tenth Census U. S., Report on the production, technology and uses of petroleum and its products, pp. 37-52, 1884. Reference to Kentucky.

PEMBERTON, J. R.

558. A resume of the past year's development in Kentucky from a geologic standpoint: Bull. Am. Assn. of Petrol. Geologists, vol. 2, 1918, pp. 38-52.

PETER, ALFRED M., and others.

559. Analyses of mineral and potash waters of Kentucky: Kentucky Agr. Exp. Sta., Annual Reports from 1888 to 1918.

560. Preliminary work on some Kentucky marls: Kentucky Agr. Exp. Sta., Bulletin No. 39, 1892. Also in Annual Report of same year.

PETER, ROBERT.

561. Chemical analyses: Kentucky Geol. Surv., vol. A, 477 pp., 1884.

562. Chemical analyses: Kentucky Geol. Surv., vol. A, part 2, 328 pp., 1885.

563. Chemical report: Kentucky Geol. Surv., vol. 1, pp. 253-400, 1856.

564. Chemical report: Kentucky Geol. Surv., vol. 3, pp. 175-420, 1857.
565. Chemical report: Kentucky Geol. Surv., vol. 4, pp. 41-321, 1861.
566. Chemical report: Kentucky Geol. Surv., Report of progress, vol. 4, new series, pp. 137-316, 1878.
567. Chemical report on coals, clays, mineral waters, etc.: Kentucky Geol. Surv., Bulletin No. 3, 77 pp., 1905.
568. Second chemical report of the ores, rocks, soils, coals, mineral waters, etc., of Kentucky: Kentucky Geol. Surv., vol. 2, pp. 117-300, 1857.
569. Chemical report of the soils, coals, ores, iron furnace products, clays, marls, mineral waters, rocks, etc., of Kentucky: Kentucky Geol. Surv., vol. 5, part 5, second series, pp. 163-487, 1880.
570. Chemical report of the soils, marls, ores, coals, iron furnace products, mineral waters, etc., of Kentucky: Kentucky Geol. Surv., Report of Progress, vol. 1, new series, pp. 137-316, 1876.
571. The composition of petroleum. Two analyses: Ky. Geol. Surv., Chem. Analyses A, Part 3, pp. 66-68, 1888. (Edition exhausted.)

PHALEN, W. C.

572. Clay resources of northeastern Kentucky: U. S. Geol. Surv., Bulletin No. 385, pp. 411-416, 1906.
573. Coal resources of the Kenova quadrangle: U. S. Geol. Surv., Bulletin No. 285, pp. 259-268, 1 fig., 1906.
574. Description of the Kenova Quadrangle (Kentucky-West Virginia-Ohio): U. S. Geol. Surv., Geol. Atlas, Kenova folio (No. 184), 16 pp., 4 pls (maps and sections), 13 figs., 1912. Abstract, Wash. Acad. Sci. Journ., vol. 3, No. 17, p. 455, Oct. 19, 1913.
575. Economic geology of the Kenova Quadrangle (Kentucky. Ohio and West Virginia): U. S. Geol. Surv., Bulletin No. 349, 158 pp., 6 pls., 21 figs., 1908.
576. Origin and occurrence of certain iron ores of northeastern Kentucky: Econom. Geol., vol. 1, No. 7, pp. 660-763, 1 fig., 1906.
577. Phosphate rocks of central Kentucky: Kentucky Geol. Surv., 80 pp., 19 pls., 2 maps, Nov., 1917.

PIRSSON, LOUIS V.

578. A Textbook of Geology: Physical Geology, 444 pp., illustrated, 1 colored geological map of North America. Numerous references to Kentucky.

POGUE, JOSEPH E.

579. The economics of Petroleum, pp. 375, illustrated. John Wiley & Sons, New York City, 1921. References to Kentucky petroleum production.

PROCTER, JOHN R.

579a. Geological formations for Kentucky in Macfarlane's Am. Geol. Railway Guide, pp. 191-192, 1879. Second edition, pp. 395-400, 1890. See Macfarlane, James.

580. Report of progress of the Kentucky Geol. Surv., from Jan., 1884, to Jan., 1886, 20 pp., 1886.

581. Report of progress of the Kentucky Geol. Surv. for the years 1886 and 1887, 28 pp., 1887.

582. Mineral resources of Kentucky: Eng. and Mining Journ., vol. 44, pp. 372-376, 1887.

583. Preliminary map of Kentucky, scale 20 miles to 1 inch, in pocket cover: Kentucky Geol. Surv., 1891. Accompanied Edward Orton's report on petroleum, gas and asphalt rock.

584. Report of progress of the Kentucky Geol. Surv., Abstract, Amer. Journ. Sci., 3d series, vol. 44, p. 78, 1892.

584a. Remarks on the relations of Orange sands and certain gravels in the western Kentucky region: Geol. Soc. America Bulletin, vol. 1, pp. 476-477, 1890.

PULTZ, JOHN LEGGETT.

584b. Big Stone Gap coal field of Virginia and Kentucky: Eng. Mag., vol. 28, pp. 71-85, 11 figs., 1904.

585. Mining in the Cumberland Gap coal field: Eng. and Mining Journ., vol. 83, pp. 808-810, 2 figs., April 27, 1907.

QUICKEL, R. D.

586. Analyses and heat values of coals: Kentucky Geol. Surv., Rept. Prog., 1908-1909, pp. 102-126, 1910.

REDWOOD, SIR BOVERTON.

587. A Treatise on Petroleum, illustrated, vol. 1, pp. 1-364; vol. 2, pp. 365-740; vol. 3, pp. 741-1353. Pub. Charles Griffin & Co., London, J. B. Lippincott, Phila., 1922. Vol. 1, Brief statement of Ky. oil geology, pp. 228-229, origin Ky. oil, p. 356. Vol. 2, references to Ky. Vol. 3, Kentucky petroleum production, etc.

RICE, G. S., et al.

588. Analysis of Kentucky Coals: U. S. Bureau of Mines, Tech. Pap. No. 308, 92 pp., 1922. A brief statement by several authors of characteristics of Kentucky coals and representative analyses from both coal fields of Kentucky.

RICE, THOMAS D.

589. Soil survey of McCracken County: U. S. Dept. of Agr., Bureau of Soils, 1905, and a separate, 1906.

RICE, THOMAS D., and GEISH, W. J.

590. Soil survey of Warren County: U. S. Dept. of Agr., Bureau of Soils, 1904, and a separate, 1905.

RICHARDSON, CHARLES HENRY.

591. The Glass Sands of Kentucky: Kentucky Geol. Surv., series 6, vol. 1, 149 pp., 1920. A detailed report of examination, analysis and industrial valuation of the principal glass sands of Kentucky.

592. The Building Stones of Kentucky: Kentucky Geol. Surv., series 6, vol. 11, 1923. A detailed description of 616 quarries and all of the best building stones in Kentucky, including limestones, marbles and sandstones.

RIES, HEINRICH.

593. Clays of the United States: U. S. Geol. Surv., Professional Paper No. 11, 1903. Kentucky clays described on pp. 114-132.

594. Clays of the United States east of the Mississippi River: U. S. Geol. Surv., Professional Paper No. 11, 298 pp., 9 pls., 11 figs., 1903.

595. Clays: Their occurrence, properties, and uses, etc., 490 pp., illustrated. John Wiley & Sons, New York City, 1906. Many references to Kentucky clays and clay industries.

596. Fire Clays of the Eastern Coal Field of Kentucky. Journ. Am. Cer. Soc., vol. 5, No. 7, pp. 397-408, 6 photos., July, 1922.

597. Clays of Kentucky, 262 pp., illustrated. Ky. Geol. Surv., series 6, vol. 8, 1922. Detailed statement respecting geology of Ky. clays, slabs, etc., and their industries.

598. Economic Geology, 856 pp., illustrated, 4th edition. John Wiley & Sons, New York City, 1916. Numerous references and descriptions of Kentucky mineral resources.

RIES, HEINRICH, and WATSON, THOMAS L.

599. Engineering Geology, 667 pp., illustrated, 1st ed., John Wiley & Sons, New York City, 1914. Many references to Kentucky.

600. Elements of Engineer Geology, 365 pp., illustrated, John Wiley & Sons, New York City, 1921. Numerous references to Kentucky.

RIES, H., and BEYLEY, W. S.

601. High-grade Clays of the Eastern United States. Bull. 708, U. S. Geol. Surv., 314 pp., 30 pls. and maps, 38 figs., 1922. Discusses geology of many Kentucky clays and shales and refers to associated industries.

ROBINSON, DR. SAMUEL.

602. A Catalogue of American Minerals with their Localities, including all which are known to exist in the United States and British Provinces, etc. Cummings, Hilliard & Co., Boston, Pub., 1825. (Transylvania University Library.) Refs. to Ky. minerals, mineral waters, ores, etc., pp. 228, 229, 230 and 231.

ROGERS, H. DARWIN.

603. An inquiry into the origin of the Appalachian coal strata, bituminous and anthracite: Asso. Am. Geol. Trans., pp. 433-478, 1843. Abstract, Ibid., p. 71, and Am. Journ. Sci., vol. 43, pp. 178-179, 1842. Reference to Kentucky.

604. Coal fields of the United States and British provinces: Pensylvania Geol. Surv., vol. 2, pp. 942-1019, Philadelphia, 1858. Reference to Kentucky.

605. Sketch of the geology of the United States: Pennsylvania Geol. Surv., vol. 2, pp. 741-755, Philadelphia, 1858. Reference to Kentucky.

ROGERS, JULIA ELLEN.

606. Earth and Sky Every Child Should Know, 244 pp., 30 illus., Grosset & Dunlap, New York City, 1910. Simple description of the Mammoth Cave region of Kentucky.

RUSSELL, ISRAEL C.

607. Rivers of North America, 327 pp., illustrated. G. P. Putnam's Sons, N. Y. City, 1898. Describes, pp. 88, 89 and 90, geology and topography of Green and Echo Rivers, Ky.

RUSSELL, J.

608. Map of the State of Kentucky with the Adjoining Territories. Published as the Act directs, Dec. 27, 1794, by H. P. Symonds, No. 20 Paternoster Row, London.

RUSSELL, PHILIP G.

Clay County: See Hodge, James, and Russell, Philip.

RUSSELL(PHILIP G., and BROWNING, I. B.

The coal of Magoffin County: See Browning, I. B.

SAFFORD, JAMES M.

609. Note on the geological position of petroleum reservoirs in southern Kentucky and in Tennessee: Am. Journ. Sci., 2nd series, vol. 42, pp. 104-107, 1866.

610. Physico-geographical and agricultural features of the States of Tennessee and Kentucky: Tenth Census of the U. S., vol. 5, report on cotton production in the United States, part 1, pp. 381-469, Washington, 1884.

611. Silurian basin of middle Tennessee, with notices of strata surrounding it: Am. Journ. Sci., 2nd series, vol. 12, pp. 352-361, 1851. Reference to Kentucky.

SALISBURY, ROLLIN D.

On the relationship of the Pleistocene to the pre-Pleistocene, etc.: See Chamberlin, T. C., and Salisbury, R. D.

SAMPSON, F. A.

612. New Madrid and other earthquakes of Missouri: Seism. Soc. Am. Bulletin, vol. 3, No. 2, pp. 57-71, June, 1913. The New Madrid earthquake affected southwestern Kentucky.

SAMPSON, R. J.

Harlan coal field in Kentucky: See Peck, W. R., and Sampson, R. J.

SAYLER, N.

613. Geological map of Kentucky (scale 5 miles to 1 inch): Cincinnati, 1865.

SCHENK, C.

614. Topographical report on a part of Greenup and Lawrence Counties for the year 1874: Kentucky Geol. Surv., vol. 5, part 5, second series, pp. 14-42, 1880.

SCHUCHERT, CHARLES.

Development of the brachial support in Dielasma and Zygospira: See Beecher, Charles E., and Schuchert, Charles.

615. A Textbook of Geology, part 2, Historical geology, 1026 pp., illustrated. Reduced geological map of North America in colors. John Wiley & Sons, New York City, 1915. Numerous references to the stratigraphy and paleontology of Kentucky.

616. A Century of Geology, 1818-1918. Historical Geology, 103 pp., Am. Journ. Sc., vol XLVI, July, 1918. Many references to Kentucky, see pp. 62, 70, 74, etc.

SCOTT, D. H., and JEFFREY, E. L.

617. On fossil plants showing structure from base of the Waverly shale of Kentucky: Royal Soc. London, Philos. Trans., series 13, vol. 205, pp. 315-373, 13 pls., 5 figs., 1914.

SELVIG, W. A., and FIELDNER, A. C.

618. Fusibility of Ash from Coal of the United States: U. S. Bureau of Mines, Bull. 209, 1922. Many references to Kentucky.

SHALER, N. S.

619. Account of Kentucky geology on p. 29 in History of Kentucky.

620. Antiquity of cavern life of the Ohio Valley: Kentucky Geol. Surv., vol. 1, Memoirs, 13 pp., 1876.

621. Cavern and cavern life: Aspects of the earth, pp. 96-142, Scribner's, 1884.

622. Fossil brachiopods of the Ohio Valley: Kentucky Geol. Surv., Monograph, vol. 2, part 4, 44 pp., 7 pls., 1877.

623. General account of the Commonwealth of Kentucky, prepared by the geological survey of the Commonwealth, A: Kentucky Geol. Surv., Report of Progress, vol. 2, new series, pp. 361-468, 1877. Also published separately.

624. Report of Progress for the geological survey of Kentucky: Kentucky Geol. Surv., vol. 3, new series, 451 pp., 5 maps, 1877. Includes Joseph Lesley's report on the outcrop belt of the eastern Kentucky coal field.

625. Introduction to nature and origin of deposits of phosphate of lime, by R. A. F. Penrose, Jr.: U. S. Geol. Surv., Bulletin No. 46, vol. 7, pp. 483-494, 1888. Reference to Kentucky.

626. Kentucky in American Commonwealth series, chapter 3 and 4: Houghton, Mifflen & Co., 1884.

627. Notes on the age and structure of the several mountain axes in the neighborhood of Cumberland Gap: Am. Naturalist, vol. 111, pp. 385-392, 1877.

628. Notes on the investigations of the Kentucky Geol. Surv., during the years 1873-4 and 5, in part 3, vol. 3, pp. 154, second series and a separate.

629. On the origin of the galena deposits of the Cambrian rocks of Kentucky: Kentucky Geol. Surv., Report of Progress, vol. 2, new series, pp. 277-292, 1877.

630. Origin and nature of soils: U. S. Geol. Surv., 12th Annual Report, 1890-1. Reference to Kentucky on pp. 285, 296, 298, 301-306 (soil inheritance), 325 (origin of the Barrens), 333-338 (effect of soil character on diffusion of slavery).

631. On the original connection of the eastern and western coal fields of the Ohio Valley: Harvard Collection Comp. Zool., Memoirs, vol. 16, No. 2, 11 pp., 1887.

632. Petroleum: Kentucky Geol. Surv., Bulletin No. 1, pp. 5-12, 1887(?).

633. Preliminary report concerning the resources of the country adjacent to the line of the proposed Richmond and Southwestern Railway: Map. Cambridge, Mass., 1880. Includes geological maps of Kentucky and Virginia, by W. B. Rogers.

634. Sources of boulders in Ohio, Kentucky, etc.: Boston Society of Natural Hist. Proceedings, vol. 14, p. 386, 1872.

635. Vol. 3, new series: Kentucky Geological Survey, 1877. Contents:

Part 1. Plans of the Survey, pp. 3-30.
Part 2. Operations of the Survey from 1854-1860, pp. 33-97.
Part 3. Investigations of the Survey from 1873-1875.
Chapter 1. Original extent of the geological formations in Kentucky, etc., pp. 133-147.
Chapter 2. Geological succession of the Kentucky series, pp. 20-65.
Chapter 3. Soil periods of Kentucky, pp. 65-80.
Chapter 4. Dynamical geology, pp. 84-112.
Appendix. Rainfall, etc., annual reports and description of maps, pp. 241-425.

636. The United States of America, 2 vols. D. Appleton & Co., 1897, see vol. 1, pp. 102-118. Many references to the geology, physiography and natural resources of Kentucky.

SHAW, E. W.

637. Irvine oil field: U. S. Geol. Surv., Bulletin No. 661, D, 191 pp., 3 pls. (two of them maps), 7 figs., 1917.

638. Newly discovered beds of extinct lakes in southern and western Illinois: Illinois Geol. Surv., Bulletin No. 20, pp. 139-157, 2 maps, 4 figs., 1915. Reference to Kentucky.

639. System of Quaternary lakes in the Mississippi Basin: Geol. Soc. Am. Bulletin, vol. 22, No. 4, pp. 732-733 (Abstract), Dec. 15, 1911. Washington Acad. Sci. Journ., vol. 1, No. 4, pp. 141-142 (Abstract), 1911. And a preliminary statement, Journ. Geol., vol. 19, No. 6, pp. 481-491, 4 figs., 1911. Also in Illinois Geol. Surv., Bulletin No. 20. Reference to Kentucky.

SHAW, E. W., and MATHER, K. F.

640. The Oil Fields of Allen County, Ky.: U. S. G. S., Bull. 688, 10 pls., 10 figs., 1919. A detailed study of the occurrence of petroleum in this part of Kentucky.

SHIPPEN, JOHN P.

641. Mining coal in Big Stone Gap field, Kentucky: Eng. and Min. Journ., vol. 85, pp. 1287-1290, 9 figs., June 27, 1908.

SHUMARD, B. F. (M. D.), and YANDELL, L. P. (M. D.).

642. Notice of a new Fossil Genus belonging to the Family Blastoidea, from the Devonian Strata near Louisville, Ky. Proc. Acad. of Nat. Sc., 3 pp., 1 pl., March, 1856. (Pvt. Lib. W. R. Jillson.)

SHUMARD, B. F.

Contributions to the geology of Kentucky: See Yandell, L. P., and Shumard, B. F.

SILLIMAN, BENJAMIN, JR.

643. On the Mammoth Cave of Kentucky: Am. Journ. Sci., 2nd series, vol. 12, pp. 256-261, 1851.

SMITH, GEORGE OTIS.

644. Forty-second Ann. Rept. of the Director of the U. S. Geol. Survey, year ended June 30, 1921, U. S. G. S., 1921. References to Kentucky.

645. Forty-third Ann. Rept. of the Director of the U. S. Geol. Survey, year ended June 30, 1922, 79 pp., 1 map, U. S. G. S., 1922. References to Kentucky.

SMITH, J. LAWRENCE.

646. Report on Dupont s artesian well at Louisville, Kentucky: Am. Journ. Sci., 2nd series, vol. 27, pp. 174-178, 1859.

SMITH, W. S. TANGIER.

Lead, zinc and fluorspar deposits of western Kentucky: See Ulrich, E. O., and Smith, W. S. Tangier.

SPENCER, J. W.

647. Ancient Mississippi and its tributaries, The: Kansas City Review, vol. 6, pp. 615-621, 1883. Reference to Kentucky.

SOPER, E. K., and OSBON, C. C.

648. The Occurrence and Uses of Peat in the United States, Bull. 728, U. S. Geol. Survey, 702 pp., 18 pls. and maps, 32 figs., 1922. References to Kentucky.

SPRINGER, FRANK.

649. The Fossil Crinoid Genus Polatocrinus and its allies. Smithsonian Institution, United States National Museum, Bull. 115, 1921, 78 pp., 16 pls. Describes Devonian Crinoids of the Louisville area.

650. The crinoid fauna of the Knobstone formation: U. S. Nat. Mus. Proc., vol. 41, pp. 175-208, June 24, 1911. Reference to Kentucky.

SQUIER, G. H.

651. Erratic pebbles in the Licking Valley: Science, vol. 2, p. 436, 1883.

ST. CLAIR, STUART.

652. The Irvine oil district: Dept. of Geol. and Forestry of Ky., Series 5, Resources of Kentucky, vol. 1, Paper No. 2, 1919.

653. The Oil Pools of Warren County, Ky.: Ky. Geol. Survey, series 6, vol. 6, paper No. 4, pp. 103-148, illustrated.

STEELE, G. D.

654. Mining of Kentucky rock asphalt and construction of asphalt-macadam roads: Better Roads and Better Streets, vol. 5, No. 5, pp. 15-17, 1915.

STEVENS, R. P.

655. Evidences of glaciation in Kentucky: Science, vol. 1, pp. 510-511, 1883.

656. Observations on some irregularities on the floor of the coal measures of eastern Kentucky: New York Lyceum Nat. Hist. Annals, vol. 11, pp. 18-29, 1876.

STEVENS, W. LE CONTE.

657. On the Mammoth Cave of Kentucky: New York Acad. Sci. Trans., vol. 1, pp. 58-65, 1882.

STEVENSON, JOHN J.

658. Carboniferous of the Appalachian Basin: Geol. Soc. Am. Bulletin, vol. 15, pp. 37-210, 1904. Reference to Kentucky.

659. Lower Carboniferous of the Appalachian Basin: Abstract, Science, new series, vol. 16, pp. 259-269, 1902; and Geol. Soc. Am. Bulletin, vol. 14, pp. 15-96, 1903. Reference to Kentucky.

STONE, RALPH W.

660. Coal resources of the Russell Fork Basin in Kentucky and Virginia: U. S. Geol. Surv., Bulletin No. 348, 127 pp., 8 pls., 25 figs., 1908.

661. Elkhorn coal field, Kentucky: U. S. Geol. Surv., Bulletin No. 316, pp. 42-54, 1 pl., 1907.

662. Pine mountain fault: Abstract, Science, new series, vol. 25, p. 25, 620, April 19, 1907.

SULLIVAN, GEORGE M.

Report on the coal field adjacent to Pineville Gap., etc.: See Crandall, A. R., and Sullivan, George M.

663. Report on the geology of parts of Jackson and Rockcastle Counties: Kentucky: Kentucky Geol. Surv., 20 pp., July, 1891.

SUTTON, GEORGE.

664. Glacial or ice deposits in Boone County, Kentucky, of two distinct and widely distant periods: Am. Asso. Adv. Sci. Proc., vol. 25, pp. 225-231, 1876. Geol. Surv. Indiana, 8th, 9th and 10th reports for 1876-77-78, pp. 108-113, 1879. Abstract, Am. Journ. Sci., 3rd series, vol. 14, p. 239, 1877.

TASSIN, WIRT.

665. The Mount Vernon (Christian County, Kentucky) meteorite: U. S. Nat. Mus. Proc., vol. 28, pp. 203-217, 2 pls., 1 fig., 1905.

TAYLOR, RICHARD C.

666. Statistics of coal with an account of geological and geographical distribution of fossil fuel in general, including bituminous substances: 754 pp., Philadelphia, 1848. Later edition issued in 1855. Reference to Kentucky.

TENNESSEEAN, (A.)

667. The Christian Advocate. Printed and sold by Thomas C. Bradford, Nashville. 357 pp. (Transylvania University Lib.) Ky. refs.: (1) Mammoth Cave mummy, p. 253; (2) ancient fortifications, p. 284; (3) Mammoth fossil, Paris, Ky., p. 285; (4) Blue Licks fossils, p. 306. (Old, rare, no date.)

THEISSEN, REINHARDT.

668. Origin and Composition of Certain Oil Shales. Economic Geology, Vol. XVI, Nos. 4 and 5, June, July and August, 1921, pp. 289-300, 2 pls. 9 and 10.

669. Microscopic Examination of Kentucky Oil Shales, — pp., U. S. Bureau of Mines Rept. No. 353D:41 in Ky. Geol. Surv., series 6, vol. 10, 1923. A detailed study under high power glass of a number of representative Kentucky oil shales, principally from the Devonian.

TIGHT, W. G.

670. Drainage modifications in southeastern Ohio and adjacent parts of West Virginia and Kentucky: U. S. Geol. Surv., Professional Paper No. 13, 111 pp., 17 pls., 1 fig., 1903.

TROOST, GERARD.

671. On the Pentremites reinwardtii, a new fossil, with remarks on the genus Pentremites and geognostic position in the States of Tennessee and Kentucky: Geol. Soc. Pennsylvania Trans., vol. 1, pp. 224-231, 1835.

TURNER, JAMES W.

672. Wonders of the Mammoth Cave of Kentucky, etc., with a chapter on the geology of the cave formation. 116 pp., 5 pls. Carrier Publishing Company, Mills, Ill. 1912.

ULRICH, E. O.

673. Chattanooga series, with special reference to the Ohio shale problem: Am. Journ. of Science, 4th series, vol. 34, pp. 157-183, 3 figs., 1912.

674. Correlation of the Lower Silurian horizons of Tennessee and part of the Ohio and Mississippi valleys with those of New York and Canada, A: Am. Geol., vol. 1, pp. 100-110, 179-190, 305-315, vol. 2, pp. 39-44, 1888.

675. Formations of the Chester series in western Kentucky and their correlates elsewhere: Kentucky Geol. Surv., Mississippian Series in Western Kentucky, 2nd part, 271, pp. 1918.

676. Lithographic stone deposits of eastern Kentucky: Eng. and and Mining Journ., vol. 73, pp. 895-896, 2 figs., 1902.

677. Lower Silurian deposits of the Upper Mississippi: A correlation of the strata with those in the Cincinnati, Tennessee, New York and Canadian provinces and the stratigraphic and geologic distribution of the fossils: Minnesota Geol. and Nat. Hist. Surv., Paleontology, vol. 3, part 2, pp. 83-129, 1897. Reference to Kentucky.

678. Ordovician-Silurian boundary: International Geological Congress Proc. at Toronto, pp. 593-667, 8 maps, 1 table, 1913. Reference to Kentucky.

679. Catalogue of Fossils Occurring in the Cincinnati Group of Ohio, Indiana and Kentucky, 31 pp., paper pamphlet. Cincinnati, James Barclay, 1880. (Priv. Lib. W. R. Jillson.)

ULRICH, E. O., and SMITH, TANGIER.

680. Lead, zinc and fluorspar deposits of western Kentucky: U. S. Geol. Surv., Professional Paper No. 36, part 1, pp. 15-105, 7 pls., by Ulrich, and part 2, pp. 107-207, 8 pls., 31 figs., by Smith, 1905.

USHER, F. C.

681. On the elevation of the banks of the Mississippi: Am. Journ. Science, vol. 31, pp. 294-296, 1837. Reference to Kentucky.

VAN DUYNE, CORNELIUS, and others.

682. Soil Survey of Shelby County, Ky., 67 pp., 1 map in colors, U. S. Dept. Agriculture and Ky. Agr. Exp. Station, 1919. A detailed presentation of the soils of this region of Kentucky.

VAN RENSSELAER, J.

683. Essay on salt, embracing a description of American salines in which reference is made to the salt licks and springs of Kentucky: Lecture given in New York before the New York Lyceum of Nat. Hist., 80 pp., 1823.

VANUXEM, LARDNER.

684. Remarks on the characters and classification of certain American rock formations: Am. Journ. Science, vol. 16, pp. 254-256, 1829. Reference to Kentucky.

VAUGHAN, THOMAS WAYLAND, and others.

684a. Report of the Committee on Sedimentation. National Research Council, 68 pp. Mimeograph, April 18, 1923, Washington, D. C. Contains references to Kentucky.

VERHOEFF, MARY.

685. Kentucky Mountains: Filson Club Publication No. 26, pp. 168-170.

686. Kentucky River navigation: Fulson Club Publication No. 28, pp. 231, 59 pls., 3 maps, 1917.

VERNEUIL, ED. DE.

687. Note sur le parallelisme des roches des depots paleozoiques de l'Amerique septentrionale avec ceux de l'Europe, suivie d'un tableau des especes fossiles communes aux deux continents, avec l'indication des etages ou elles se rencontrent, et terminee par un exam critique de chacune de ces especes: Soc. Geol. France Bulletin, 2nd series, vol. 4, pp. 646-709, 1847. Translated and condensed by James Hall, 1849. Reference to Kentucky.

VOLNEY, C. F.

688. A View of the Soil and Climate of the United States of America. Philadelphia, 1804. Translated by C. B. Brown.

WAGGAMAN, WILLIAM H.

689. Report on the natural phosphates of Tennessee, Kentucky and Arkansas: U. S. 62nd Congress, 2nd Session, Senate doc. No. 190, pp. 49-77, 3 figs., 1912. U. S. Dept. Agr., Bureau Soils, Bulletin No. 81, 36 pp., 4 pls., 3 figs., 1912.

WARD, HENRY A.

690. Bath Furnace aerolite: Rochester Acad. Sci. Proc., vol. 4, pp. 193-202, 1 pl., 1905. See also Bath Furnace meteorite (next item).

691. Bath Furnace (Kentucky) meteorite: Am. Journ. Science, 4th series, vol. 15, pp. 316-319, 1 fig., 1903.

WARDER, ROBERT B.

692. Some ochreous deposits of Kentucky and Indiana: Philadelphia Acad. Sci. Proc., vol. 34, pp. 57-58, 1883.

WATSON, THOMAS L., and GRASTY, J. SHARSHALL.

693. Barite of the Appalachian States: Am. Inst. Min. Eng. Bulletin No. 98, pp. 345-390, 1915. Trans. vol. 51, pp. 514-559, 22 figs. (incl. maps), 1916. Reference to Kentucky.

WELLER, STUART.

694. Stratigraphic and faunal succession of the Chester group in Illinois and Kentucky: Abstract, Geol. Soc. America Bulletin, vol. 27, No. 1, p. 156, March 21, 1916.

695. Oil and Gas Possibilities in Caldwell County, Kentucky: Ky. Geol. Survey, series 6, vol. 6, paper No. 8, pp. 221-231, illustrated, 1921. Gives stratigraphic geology of the Farmersville dome with oil and gas structural map.

696. Geology of the Golconda Quadrangle: Ky. Geol. Survey, series 6, vol. 4, 148 pp., 1921. Gives stratigraphic and structural geology of parts of Livingston and Crittenden Counties, with outline map showing faults.

697. Geology of the Princeton Quadrangle: Ky. Geol. Survey, series 6, vol. 10, illustrated, 1922. Gives stratigraphic and structural geology of Caldwell, Lyon, Hopkins and Crittenden Counties.

WENTWORTH, C. K.

697a. Russell Fork Fault of Southwest Virginia. Jour. of Geology, Vol. XXIX, No. 4, pp. 351-369, May-June, 1921. Also Bull. XXI, Va. Geol. Survey, pp. 53-67, 1921.

WESCOTT, H. P.

698. Handbook of casing head gas: Metric Metal Works, Erie, Pa., 1918.

699. Handbook of natural gas: Metric Metal Works, Erie, Pa., 1915. Reference to Kentucky.

700. Measurement of gas by orifice meter: Metric Metal Works, Erie, Pa., 1918. Reference to Kentucky.

WETHERBY, A. G.

701. Descriptions of new fossils from the Lower Silurian and Subcarboniferous rocks of Kentucky: Cincinnati Soc. Nat. Hist. Journ., vol. 4, pp. 177-179, 1881.

702. Remarks on the lithological character of the Trenton group about Lexington and Highbridge, Kentucky: Cin. Soc. Nat. Hist. Journ., vol. 3, p. 72, 1880.

703. Remarks on the Trenton limestone of Kentucky, with descriptions of new fossils from that formation and the Kaskaskia (Chester) group, Sub-carboniferous: Cincinnati Soc. Nat. Hist. Journ., vol. 3, pp. 144-160, pls., 1880.

704. Description of New Crinoids from the Cincinnati Group of the Lower Silurian and the Sub-carboniferous of Kentucky. Journal of the Cincinnati Soc. Natural History, vol. 2, pp. 10, 1 pl. (No. 16). 1879. (Pvt. Lib. W. R. Jillson.)

705. Descriptions of Crinoids from the Upper Sub-Carboniferous of Pulaski County, Ky., 1 pl. From Journ. Cincinnati Soc. Nat. Hist., Jan, 1881, vol 3. Printed by James Barclay, 269 Vine St., Cincinnati, O.

WHEELER, GEORGE D.

706. Zinc in Crittenden County, Kentucky: Eng. and Mining Journ., vol. 74, pp. 413-414, a figs., 1902.

WHINERY, S.

707. Clinton iron ore deposits in Kentucky and Tennessee: Am. Inst. Mining Eng., Bulletin No. 70, pp. 1057-1058, Oct., 1912.

WHITBECK, RAY HUGHES.

708. Mammoth Cave: Journ. Geography, vol. 11, pp. 327-341, 4 figs., June, 1913.

WHITE, C. A., and WHITFIELD, R. P.

709. Observation on the rocks of the Mississippi Valley, which have been referred to the Chemung group of New York, etc.: Boston Soc. Nat. Hist. Proc., vol. 8, pp. 289-306, 1862. Reference to Kentucky.

710. Review of the Cretaceous formations of North America: U. S. Geol. Surv., Correlation paper on the Cretaceous, Bulletin No. 82, 273 pp., 3 pls., 1891. Reference to Kentucky.

WHITE, DAVID.

711. Age of the Wise and Harlan formations of southwestern Virginia (and southeastern Kentucky): Abstract, Science, new series, vol. 22, pp. 335-336, 1905.

712. Correlation of Elkhorn coals: U. S. Geol. Surv., Bulletin No. 348, pp. 30-32, 1908.

WHITE, DAVID, and STADMCHENKO, T.

712a. Some Mother Plants of Petroleum in the Devonian Black Shales. Economic Geology, Vol. XVIII, No. 3, pp. 238-252, April-May, 1923.

WHITEFIELD, R. P.

Observation on the rocks of the Mississippi Valley, etc.: See White, C. A., and Whitfield, R. P.

WHITTLESEY, CHARLES.

713. On the equivalency of the rocks of northeastern Ohio and the Portage, Chemung and Hamilton rocks of New York: Am. Asso. Adv. Sci. Proc., vol. 5, pp. 207-221, 1851. Reference to Kentucky.

WILLIAMS, HENRY SHALER, and KINDLE, E. M.

714. Contributions to Devonian paleontology: U. S. Geol. Surv. Bulletin No. 244, 144 pp., 6 pls., 3 figs., 1905. Reference to Kentucky.

WILLIAMS, HENRY SHALER.

715. Devonian and Carboniferous: U. S. Geol. Surv., Correlation paper, Bulletin No. 80, pp. 279, 1891. Reference to Kentucky.

716. On the different types of the Devonion system in North America: Am. Journ. Science, 3d series, vol. 35, pp. 51-59, 1888.

WINCHELL, ALEXANDER.

717. On the geological age and equivalents of the Marshall group: Am. Phil. Soc. Proc., vol. 2, pp. 57-82, 385, 418, 1871. Reference to Kentucky.

718. Address on Public Geological Surveys and the Geological Survey of Kentucky in Particular, 21 pp. Ky. State Doc., John H. Harney, Frankfort, Ky., 1867. (Pvt. Lib., W. R. Jillson.)

WORTHEN, A. H.

719. Coal measures and Lower Carboniferous limestones: Illinois Geol. Surv., vol. 3, pp. 1-19, Chicago, 1868. Reference to Kentucky.

720. Synchronism of coal beds in Illinois with those of Kentucky: Am. Nat., vol. 5, p. 538, 1871.

WRIGHT, CHARLES W. (M. D.).

721. The Mammoth Cave: Pub. Harvey, Mason & Co., Vincennes, Ind., 68 pp., 1858.

WRIGHT, G. FREDERICK.

722. Glacial boundary in Ohio: Ohio Geol. Surv., vol. 5, Economic geology, pp. 750-769, 771-772, 1884. Reference to Kentucky.

723. Glacial boundary in Ohio, Indiana and Kentucky; 86 pp., Cleveland, 1884.

724. Glacial boundary in western Pennsylvania, Ohio, Kentucky, Indiana and Illinois: U. S. Geol. Surv., Bulletin No. 58, pp. 39-110, 7 pls., 1890. Abstract, Am. Geol. vol. 6, pp. 390-391, 1890.

725. Recent investigations concerning the southern boundary of the glaciated area in Ohio: Am. Journ. Science, 3d series, vol. 26, pp. 44-56, 1883. Reference to Kentucky.

726. Result of exploration of the Glacial boundary between New Jersey and Illinois: Am. Asso. Adv. Sci. Proc., vol. 32, pp. 202-208, 1883. Science, vol. 2, pp. 316-317, 1883. Reference to Kentucky.

727. Supposed glacial phenomena in Boyd County, Kentucky: Science, vol. 2, p. 654, 1883.

728. Theory of a glacial dam at Cincinnati and verification: Am. Nat., vol. 18, pp. 563-567, 1884. Reference to Kentucky.

728a. The Ice Age in North America. 763 pp., illustrated. Bibliotheca Sacra Co., Oberlein, Ohio. 1920.

WRIGLEY, HENRY E.

729. Geography of petroleum, geology of petroleum: Second Pennsylvania Geol. Surv., Report J, special on petroleum of Pennsylvania, pp. 15-40, 41-46, pls., maps, 1871. Reference to Kentucky.

WYER, S. S.

730. Natural gas, its production, service and conservation: Smithsonian Inst., Bulletin 102, part 7, 1918.

YANDELL, L. P., and SHUMARD, B. F.

731. Contributions to the geology of Kentucky: 36 pp. Louisville, 1847.

ZOOK, R. T.

732. The Bessemer Manual of Gasoline Recovery by the Compression Method, 155 pp., illustrated. Bessemer Gas Engine Co., Grove City, Pa., 1920. Reference to Kentucky.

CHAPTER V.

PUBLICATIONS OF THE UNITED STATES GEOLOGICAL SURVEY RELATING TO THE GEOLOGY OF KENTUCKY

Twentieth Annual Report of the United States Geological Survey, 1898-9; Charles D. Walcott, Director. 1899. (Parts II, III, IV, V, and VII, 1900.) 7 parts in 8 vols. and separate case for maps with Part V.

*b Triangulation and spirit leveling, by H. M. Wilson, J. H. Renshawe, E. M. Douglas, and R. U. Goode, pp. 211-530.

Twenty-second Annual Report of the United States Geological Survey, 1900-1901; Charles D. Walcott, Director. 1901. (Parts III and IV, 1902.) 4 parts.

*b The asphalt and bituminous rock deposits of the United States, by G. H. Eldridge, pp. 209-452, pls. xxv-lviii.

*d The northern Appalachian coal field, by David White, M. R. Campbell, and R. M. Haseltine, pp. 119-226, pls. xi-xii.

*e The southern Appalachian coal field, by C. W. Hayes, pp. 227-263, pls. xiii-xv.

*f The eastern interior coal field, by G. H. Ashley, pp. 265-305, pls. xvi-xix.

†MONOGRAPHS

41. Glacial formations and drainage features of the Erie and Ohio basins, by Frank Leverett. 1902. 802 pp., 26 pls. $1.75.

‡PROFESSIONAL PAPERS

*11. The clays of the United States east of the Mississippi River, by Heinrich Ries. 1903. 298 pp., 9 pls.

*13. Drainage modifications in southeastern Ohio and adjacent parts of West Virginia and Kentucky, by W. G. Tight. 1903. 111 pp., 17 pls.

36. The lead, zinc, and fluorspar deposits of Western Kentucky, by E. O. Ulrich and W. S. T. Smith. 1905. 218 pp., 15 pls.

An asterisk (*) indicates that this stock has been exhausted. Many of the papers so marked, however, may be purchased from the Superintendent of Documents, Washington, D. C.

†Monographs are not distributed free, but may be purchased from the Superintendent of Documents, Washington, D. C., as long as the stock lasts. An asterisk (*) indicates that this stock has been exhausted.

‡Professional papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked with an asterisk may, however, be purchased from the Superintendent of Documents, Washington, D. C.

*49. Geology and mineral resources of part of the Cumberland Gap coal field, Ky., by G. H. Ashley and L. C. Glenn, in cooperation with the State Geological Department of Kentucky, C. J. Norwood, curator. 1906. 239 pp., 40 pls.

91. The lower Eocene floras of southeastern North America, by E. W. Berry. 1916. 481 pp., 117 pls.

BULLETINS

*38. Peridotite of Elliott County, Ky., by J. S. Diller. 1887. 31 pp., 1 pl.

*58. The glacial boundary in western Pennsylvania, Ohio, Kentucky, Indiana, and Illinois, by G. F. Wright, with an introduction by T. C. Chamberlin. 1890. 112 pp., 8 pls.

*111. Geology of the Big Stone Gap coal field of Virginia and Kentucky, by M. R. Campbell. 1893. 106 pp., 6 pls.

*181. Results of primary triangulation and primary traverse, fiscal year 1900-1901, by H. M. Wilson, J. H. Renshawe, E. M. Douglas, and R. U. Goode. 1901. 240 pp., 1 pl.

*185. Results of spirit leveling, fiscal year 1900-1901, by H. M. Wilson, J. H. Renshawe, E. M. Douglas, and R. U. Goode. 1901. 219 pp.

*213. Contributions to economic geology, 1902; S. F. Emmons and C. W. Hayes, geologists in charge. 1903. 449 pp.
Lead, zinc, and fluorspar deposits of western Kentucky, by E. O. Ulrich and W. S. T. Smith, pp. 205-213.

216. Results of primary triangulation and primary traverse, fiscal year 1902-3, by S. S. Gannett. 1903. 222 pp., 1 pl.

*225. Contributions to economic geology, 1903; S. F. Emmons and C. W. Hayes, geologists in charge. 1904. 527 pp., 1 pl.
The Cumberland Gap coal field of Kentucky and Tennessee, by G. H. Ashley, pp. 259-275.

*243. Cement materials and industry of the United States, by E. C. Eckel. 1905. 395 pp., 15 pls. (See Bulletin 522.)

245. Results of primary triangulation and primary traverse, fiscal year 1903-4, by S. S. Gannett. 1904. 328 pp., 1 pl.

*276. Results of primary triangulation and primary traverse, fiscal year 1904-5, by S. S. Gannett. 1905. 263 pp., 1 pl.

*285. Contributions to economic geology, 1905; S. F. Emmons and E. C. Eckel, geologists in charge. 1906. 506 pp., 13 pls.

*(e) Iron and Manganese: The iron ores of Bath County, Ky., by E. M. Kindle, pp. 180-182.

*(f) Coal, Lignite, and Peat. Coal resources of the Kenova quadrangle (Ky.-Ohio-W. Va.), by W. C. Phalen, pp. 259-268.

*(1) Clays. Clay resources of northeastern Kentucky, by W. C. Phalen, pp. 411-416; Clays of western Kentucky and Tennessee, by A. F. Crider, pp. 417-427, pl. xiii.

310. Results of primary triangulation and primary traverse, fiscal year 1905-6, by S. S. Gannett. 1907. 248 pp., 1 pl.

*315. Contributions to economic geology, 1906, Part I, Metals and nonmetals except fuels; S. F. Emmons and E. C. Eckel, geologists in charge. 1907. 505, iv. pp., 4 pls.
Issued also in separate chapters; only the one desired should be requested.

*(k) Glass-making Materials. Glass-sand industry of Indiana, Kentucky, and Ohio, by E. F. Burchard, pp. 361-376.

*316. Contributions to economic geology, 1906, Part II, Coal, Lignite, and Peat; M. R. Campbell, geologist in charge. 1907. 543, v pp., 23 pls.
Issued also in separate chapters; only the one desired should be requested.

*(a) Coal Fields of Pennsylvania, Kentucky, Virginia, and Alabama. The Elkhorn coal field, Ky., by R. W. Stone, pp. 42-54, pl. iii.

*348. Coal resources of the Russell Fork basin in Kentucky and Virginia, by R. W. Stone. 1908. 127 pp., 8 pls.

*349. Economic geology of the Kenova quadrangle, Ky., Ohio, and W. Va., by W. C. Phalen. 1908. 158 pp., 6 pls.

*430. Contributions to economic geology (short papers and preliminary reports), 1909, Part I, Metals and nonmetals except fuels; C. W. Hayes and Waldemar Lindgren, geologists in charge. 1910. 653 pp., 14 pls.
Issued also in separate chapters; only the one desired should be requested. The pagination given is that of the volume, which differs from that of the separates.

*(f) Structural Materials. Oolitic limestone at Bowling Green and other places in Kentucky, by J. H. Gardner, pp. 373-378.

440. Results of triangulation and primary traverse for the years 1906, 1907, and 1908; R. B. Marshall, chief geographer. 1910. 688 pp., 1 pl.

*471. Contributions to economic geology (short papers and preliminary reports), 1910, Part II, Mineral fuels; M. R. Campbell, geologist in charge. 1912. 663 pp., 62 pls.

Issued also in separate chapters; only the one desired should be requested. The pagination given is that of the volume, which differs from that of the separates.

Petroleum and Natural Gas Section.

*(a) The Campton oil pool, Ky., by M. J. Munn, pp. 9-17, pls. i-ii; Oil and gas development in Knox County, Ky., by M. J. Munn, pp. 18-29, pls. iii-iv.

This chapter has been reprinted in five separate pamphlets:

*(a-1) Petroleum and natural gas in Kentucky, pp. 9-29, pls. i-iv.

Coal and Lignite Section.

*(j) Miscellaneous analyses of coal samples from various fields of the United States, pp. 629-655.

496. Results of triangulation and primary traverse for the years 1909 and 1910; R. B. Marshall, chief geographer. 1912. 392 pp., 2 pls.

*522. Portland cement materials and industry in the United States, by E. C. Eckel, with contributions by E. F. Burchard and others. 1913. 401 pp., 19 pls.

*531. Contributions to economic geology (short papers and preliminary reports), 1911, Part II, Mineral fuels; M. R. Campbell, geologist in charge. 1913. 361 pp., 24 pls.

Issued also in separate chapters; only the one desired should be requested. The pagination given is that of the volume, which differs from that of the separates.

Petroleum and Natural Gas Section.

*(a) The Menifee gas field and the Ragland oil field, Ky., by M. J. Munn, pp. 9-26, pls. i-iv.

Coal and Lignite Section.

*(m) Miscellaneous analyses of coal samples from various fields of the United States, pp. 331-355.

*541. Contributions to economic geology (short papers and preliminary reports), 1912, Part II, Mineral fuels; M. R. Campbell, geologist in charge. 1914. 532 pp., 29 pls.

Issued also in separate chapters; only the one desired should be requested. The pagination given is that of the volume, which differs from that of the separates.

Coal and Lignite Section.

(f) The coal resources and general geology of the Pound quadrangle of Virginia and Kentucky, by Charles Butts, pp. 165-221, pls. ix-xi.

*(k) Analyses of coal samples from various fields of the United States, by M. R. Campbell, pp. 491-526.

554. Results of spirit leveling in Kentucky, 1898 to 1913, inclusive; R. B. Marshall, chief geographer. 1914. 184 pp., 1 pl. (See Bulletin 673.)

*579. Reconnaissance of oil and gas fields in Wayne and McCreary Counties, Ky., by M. J. Munn. 1914. 105 pp., 6 pls.

*585. Useful minerals of the United States, compiled by Samuel Sanford and R. W. Stone. 1914. 250 pp. (See Bulletin 624.)

624. Useful minerals of the United States, compiled by F. C. Schrader, R. W. Stone, and Samuel Sanford (a revision of Bulletin 585). 1916. 412 pp.

644. Triangulation and primary traverse, 1913-1915; R. B. Marshall, chief geographer. 1916. 655 pp., 2 pls.

Separates of Bulletin 644 have been issued as follows:

(h) Triangulation and primary traverse in Kentucky, Tennessee, and Arksansas, 1913-1915, pp. 391-404, pl. ii.

661. Contributions to economic geology (short papers and preliminary reports), 1917, Part II, Mineral fuels; David White, G. H. Ashley, and M. R. Campbell, geologists in charge. 1918. 328 pp., 29 pls.

Issued also in separate chapters; only the one desired should be requested.

(d) The Irvine oil field, Estill County, Ky., by E. W. Shaw, pp. 141-192, pls. xi-xv.

673. Spirit leveling in Kentucky, 1914 to 1916, inclusive; R. B. Marshall, chief geographer. 1918. 100 pp., 1 pl.

688. The oil fields of Allen County, Ky., with notes on the oil geology of adjoining counties, by E. W. Shaw and K. F. Mather. 1919. 126 pp., 10 pls.

WATER-SUPPLY PAPERS

*44. Profiles of rivers in the United States, by Henry Gannett. 1901. 100 pp., 11 pls.

49. Operations at river stations, 1900, Part III. 1901. 96 pp.

*57. Preliminary list of deep borings in the United States, Part I, Alabama-Montana, by N. H. Darton. 1902. 60 pp. (See Water-Supply Papers 61 and 149.)

102. Contributions to the hydrology of eastern United States, 1903; M. L. Fuller, geologist in charge. 1904. 522 pp.

Notes on the wells, springs, and general water resources of certain eastern and central States; Kentucky, pp. 369-373, by L. C. Glenn.

---

[44] Water supply papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*[44]) indicates that this stock has been exhausted. Many of the papers marked in this way may, however, be purchased from the Superintendent of Documents, Washington, D. C.

110. Contributions to the hydrology of eastern United States, 1904; M. L. Fuller, geologist in charge. 1905. 211 pp., 5 pls.
    Water resources of the Middlesboro-Harlan region of southeastern Kentucky, by G. H. Ashley, pp. 177-178.

*114. Underground waters of eastern United States; M. L. Fuller, geologist in charge. 1905. 285 pp., 18 pls.
    Tennessee and Kentucky, by L. C. Glenn, pp. 198-208.

149. Preliminary list of deep borings in the United States (second edition, with additions), by N. H. Darton. 1905. 175 pp.

*164. Underground waters of Tennessee and Kentucky west of Tennessee River and of an adjacent area in Illinois, by L. C. Glenn. 1906. 173 pp., 7 pls.

*169. Report of progress of stream measurements for the calendar year 1905, Part V, Ohio and lower eastern Mississippi River drainages, by M. R. Hall, F. W. Hanna, and J. C. Hoyt. 1906. 153 pp., 1 pl.

*205. Surface water supply of Ohio and lower eastern Mississippi River drainages, 1906; M. R. Hall, N. C. Grover, and A. H. Horton, district hydrographers. 1907. 123 pp., 3 pls.

*233. Water resources of the Bluegrass region, Ky., by G. C. Matson, with a chapter on the quality of the waters, by Chase Palmer. 1909. 223 pp., 3 pls.

236. The quality of surface waters in the United States, Part I, Analyses of waters east of the one-hundredth meridian, by R. B. Dole. 1909. 123 pp.

243. Surface water supply of the United States, 1907-8, Part III, Ohio River basin, prepared under the direction of M. O. Leighton by A. H. Horton, M. R. Hall, and R. H. Bolster. 1910. 224 pp., 4 pls.

283. Surface water supply of the United States, 1910, Part III, Ohio River basin, prepared under the direction of M. O. Leighton, by A. H. Horton, M. R. Hall, and H. J. Jackson. 1912. 158 pp., 2 pls.

303. Surface water supply of the United States, 1911, Part III, Ohio River basin, prepared under the direction of M. O. Leighton by A. H. Horton, M. R. Hall, and H. J. Jackson. 1913. 112 pp., 4 pls.

323. Surface water supply of the United States, 1912, Part III, Ohio River basin, by A. H. Horton, W. E. Hall, and H. J. Jackson. 1914. 118 pp., 2 pls.

334. The Ohio Valley flood of March-April, 1913, including comparisons with some earlier floods, by A. H. Horton and H. J. Jackson. 1913. 96 pp., 22 pls.

353. Surface water supply of the United States, 1913, Part III, Ohio River basin, by A. H. Horton, W. E. Hall, and H. J. Jackson. 1915. 264 pp., 5 pls.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke. 1914. 40 pp.

383. Surface water supply of the United States, 1914, Part III, Ohio River basin; N. C. Grover, chief hydraulic engineer; A. H. Horton and W. E. Hall, district engineers. 1916. 125, xxxii pp., 2 pls.

403. Surface water supply of the United States, 1915, Part III, Ohio River basin; N. C. Grover, chief hydraulic engineer; A. H. Horton and W. E. Hall, district engineers. 1917. 175, xxxiv pp., 2 pls.

433. Surface water supply of the United States, 1916, Part III, Ohio River basin; N. C. Grover, chief hydraulic engineer; A. H. Horton and W. E. Hall, district engineers. 1918. 205, xxxii pp., 2 pls.

FOLIOS OF THE GEOLOGIC ATLAS OF THE UNITED STATES RELATING TO THE GEOLOGY OF KENTUCKY.

No.	Name of Folio	State	Area in sq. mi	Author	Mineral products [1a] described as occurring in area of folio
*12	1894 Estillville	Va.-Ky.-Tenn.	957	Campbell, M. R.	*Coal*, iron, marble, limestone.
*46	1898 Richmond	Ky.	944	Campbell, M. R.	Coal, fluorite, phosphate, clay, stone, road metal.
*47	1898 London	Ky.	950	do	*Coal*, stone.
†184	1912 Kenova	Ky.-Ohio-W. Va.	938	Phalen, W. C.	*Coal*, clay, shale, limestone, iron ore, building stone, glass sand, salt, oil, gas.

[1a] Products of greatest importance are printed in italics.

*An asterisk (*) indicates that the stock of the folio is exhausted, but some of these folios, indicated by footnote, have been reprinted.

† Issued in two editions—library (18 by 22 inches) and octavo (6 by 9 inches). Specify edition desired.

CHAPTER VI.

STATE AND MISCELLANEOUS MAPS OF KENTUCKY.

STATE MAPS OF KENTUCKY

(All of these state maps are exhausted in edition and are no longer available for distribution, except the Geological Map of the State of 1923, which is the last named. Many of these maps as listed are on file in libraries where they may be secured for purposes of review.)

1865. Geol. map of Ky.; exhibiting the locations of the cos., cities, villages, post-offices, rwy. stations, etc., the rwys., common roads, etc. Published by E. Mendenhall, Cincinnati, Ohio, 1865. Scale: 20 mi.=1 in.

1875. Kentucky Geological Survey, 1875. Preliminary map compiled from various surveys by N. S. Shaler. 50 miles=4 inches. (1 A. R. state bureau of agri., horti., and statistics 1878 next last cover.)

1875. Kentucky Geological Survey. Preliminary (geol.) map, compiled from various surveys by L. Trouvelot. Scale: 50 miles=4 in. (Same n. s. v. 3, in pocket.) Coal sections.

A new map of Ky. made for bureau of agric., hortic., and statistics. Scale: 1893 statute mi.=1 in.

1880. Map No. 1 (of Kentucky) showing progress of work to Jan. 1, 1880, colored, 11x16¼ in. Kentucky Geological Survey, series II, Procter.

1882. Map of Kentucky, geologic (10x20 wide).

1885. Ky. geol. survey. J. R. Procter, director. Map of Ky. Scale: 26½ miles=1 in. (6 A. R. bureau of agric., hortic., and statistics 1885 facing p. 476.)

On the back of this map is printed a detailed description of Ky.: her area; population; temperature; rainfall; location; healthfulness; climate; agric. products; mineral resources; timbers; financial condition, etc.

1887. Preliminary map (geological) of Kentucky, by J. B. Hoeing, colored. Scale: 20 miles=1 inch. Kentucky Geological Survey, Series II, Procter.

1887. Preliminary map of Kentucky by J. B. Hoeing. Printed for the State Inspector of Mines by the Kentucky Geological Survey, Series II, Procter. Shows eastern and western coal fields in brown, also railroads, etc.

1887. Preliminary county map of Kentucky, by J. B. Hoeing. Prepared for the Kentucky Railroad Commissioners by the Kentucky Geological Survey, colored. Scale: 20 mi.=1 in. Kentucky Geological Survey, Series II, Procter.

1887. Preliminary county map of Kentucky, by J. B. Hoeing, colored. Scale: 20 miles=1 inch. Kentucky Geological Survey, Series II, Procter.

1887. A new (geographic-county) Map of Kentucky, by J. B. Hoeing, made for the Kentucky Bureau of Agriculture, Horticulture and Statistics. Scale: 20 miles=1 inch. Colored. Pub. in Seventh Annual report from the Bureau of Ag., Hort. and Sta. of the State of Kentucky, by John F. Davis.

A new geological map of Ky. made for the bureau by J. B. Hoeing, topographer. Scale: 20 miles=1 in. (7 A. R. bureau of agri., hortic., and statistics, 1887; facing p. 232.)

Map of the United States east of Long. 102°W (Showing Kentucky in pale red) by J. B. Hoeing (8x11 inches) Kentucky Geological Survey, Series II, Procter. (No date.)

1889. Preliminary (geological) map of Kentucky, by J. B. Hoeing. Scale: 10 mi.=1 in. Ky. G. S., Series II, Procter.

1889. Preliminary map of Kentucky (county map), by J. B. Hoeing, colored Scale: 10 mi.=1 in.. Kentucky Geological Survey, Series II, Procter.

1891. Preliminary (geological) map of Kentucky, by J. B. Hoeing (colored). Shows surficial geology as Lower Silurian, Upper Silurian, Devonian, Subcarboniferous (upper and lower), Carboniferous, Cretaceous, Quaternary, and River Alluvium. General (geological) Section from Mississippi River to Mouth of Big Sandy River given. Mountain areas stippled in relief. Scale: 1 inch=10 miles. Ky. G. S., Series II, Procter. The first really good geologic map of Kentucky, now out of date geologically and geographically. Uses antiquated color scheme.

1891. Preliminary (geological) map of Kentucky (colored), by John R. Procter. Scale: 1 inch=20 miles. Ky. G. S., Series II, Procter. Very general, inaccurate and out of date.

(No date). Map of Kentucky (colored geologic), by John R. Procter. Scale: 1 inch=26½ miles. Published by Eclectic Geographies. A reconnaissance geological map of Kentucky, very generalized, inaccurate, and out of date.

1892. Map No. 2 (of Kentucky), showing Progress of Work to Jan. 1, 1892, colored. 11x6¼ in. Kentucky Geological Survey, Series II, Procter.

1905. Preliminary (geological) map of Kentucky (colored) by J. B. Hoeing. Scale: 1 inch=2 miles. Ky. G. S., Series III, Norwood. Fairly accurate map, now out of date.

1907. Preliminary (geological) map of Kentucky (colored), by J. B. Hoeing. Scale: 1 inch=10 miles. 2 generalized geologic sections. Ky. G. S., Series III, Norwood. Shows Ordovician (Cincinnatian and Mohawkian), Silurian, Devonian, Carboniferous

(Mississippian showing Keokuk-Waverly, and Chester, St. Louis, Warsaw; and Coal Measures), Cretaceous, Tertiary, Quaternary, Recent. A fair map—now out of date.

1914. State of Kentucky (map of), compiled by the U. S. G. S. R. B. Marshall, chief geol., and A. F. Hassan, cartographer. Black and white. Scale: 1:500,000 (standard scale for map of the world). An excellent base map.

1915. Preliminary (geological) map of Kentucky (colored), by L. M. Sellier. Scale: 1 inch=10 miles. Ky. G. S., Series IV., Hoeing. Shows Ordovician, Silurian, Devonian, Carboniferous, Cretaceous, Quaternary and Recent sediments. A good map, now out of date.

1915. Preliminary (base) map of Kentucky, by L. M. Sellier. Base black, drainage blue. Scale: 1 inch=10 miles. Ky. G. S., Series IV, Hoeing. An excellent map.

1917. Preliminary (geological) map of Kentucky (colored), by L. M. Sellier. Scale: 1 inch=10 miles. Ky. G. S., Series IV, Hoeing. Shows surficial geology. Ordovician (Mohawkian and Cincinnatian), Silurian, Devonian, Carboniferous (Pennsylvania and Mississippi), Cretaceous, Quaternary, and Recent (Alluvium) sediments. 17 oil and gas pools and Cumberland oil pipe line. A good map, now out of date.

1919. Geological map of Kentucky and adjoining States, by W. R. Jillson.

1920. Geological map of Kentucky (colored), by W. R. Jillson and others. Scale: 1 inch=10 miles. Ky. Geological Survey, Series VI., Jillson.

1923. Geological map of Kentucky (colored), by W. R. Jillson and others. Scale: 1 inch=10 miles. Oil and gas areas, and Eastern and Western Coal Fields. Ky. Geol. Survey. Series VI, Jillson.

MISCELLANEOUS MAPS OF PARTS OF KENTUCKY

1857? Map No. 3. Exhibiting the topographical and geological features of Parts of Greenup, Carter, and Lawrence Counties, by Sidney S. Lyon and Edward Mylotte, topographers; and P. O. Beirne, del. Scale: 3 inches=4¾ miles. Ky. G. S., Series I, Owen. A pioneer contoured topographic map, the first to be made west of the Allegheny Mountains, and excellent for its date. Lacks designation of the contour interval.

1885. Sketch map of the region north of Pine Mountain, to acc. repts. by A. R. Crandall and J. M. Hodge. Scale: 5 mi.=1 in. Ky. G. S., Series II, Procter. Printed by L. B. Folger, Eng., Cin. Published to accompany reports of Crandall and Hodge on Letcher, Harlan, Perry and Breathitt counties.

1876 Map of the southern part of N. A., designed to show the position of the Commonwealth of Ky. No scale. Ky. G. S., Series II, Procter.

1885. Geol. map of the Jackson Purchase, comprising Ballard, McCracken, Marshall, Graves, Calloway, Hickman and Fulton Cos.; by J. B. Hoeing. Scale: 1:300,000. Ky. G. S., Series II, Procter.

1885. Map of the Jackson Purchase; by J. B. Hoeing and H. R. Ayres.. Geology in colors by R. H. Loughridge, geologist. Scale: 2 mi.=1 in. Ky. G. S., Series II, Procter.

1886. Prelim. map of South East Ky. compiled from actual surveys and field notes of members of survey; by J. B. Hoeing. Scale: 5 mi.=1 in. Ky. G. S., Series II, Procter.

1886. Agricultural map of Jackson Purchase (colored), by J. B. Hoeing, topog.; and R. H. Loughridge, geol. Scale: 1:300,000. Ky. G. S., Series II, Procter. Julius Bien & Co., Lith.

1886. Map of the Jackson Purchase showing approximate areas of distribution of the quaternary gravel; by R. H. Loughridge. Scale not given. Ky. G. S., Series II, Procter.

1889. Map showing mountain passes; by J. B. Hoeing. Scale: 15 mi.=1 in. Ky. G. S., Series II, Procter.

18(?) Preliminary map of Upper Cumberland Valley. Scale: 1 inch =5 miles. Kentucky Geological Survey, Series II, Procter.

1889. Preliminary map of Southeastern Kentucky; by J. B. Hoeing. Compiled from actual Surveys and Field Notes of members of the Survey. Scale: 5 mi.=inch. Ky. G. S., Series II, Procter.

1891. Map showing relation of eastern Kentucky coal field to the transportation points and iron ores of the south Appalachain region, by J. B. Hoeing, colored. Scale 30 miles=1 inch. Kentucky Geological Survey, Series II, Procter.

1891. Map of the Cumberland Mountain System; by J. B. Hoeing, del. Ky. G. S., Series II, Procter.

18(?) Sketch map of the Valley of the Upper Cumberland River, colored. Scale: 10 miles=27/32 of an inch. Kentucky Geological Survey, Series II, Procter.

1907-8. Map of the Western Border of the Eastern Coal Field.
Map of the Region near Pound Gap, by A. R. Crandall, geol.

1905. Map of the Big Sandy Valley, by J. B. Hoeing.

1907. Map of the Licking Valley Region, by J. B. Hoeing.

1907. Revised Preliminary map of South East Kentucky, compiled from actual surveys and field notes of members of the Survey, by J. B. Hoeing. Base in black, drainage in blue-green. Dips are plotted with arrows. Scale: 1 inch=5 miles. Ky. G. S., Series III, Norwood. A good map, accurate within its scale. Pine, Cumberland, Clinch, Black and many lesser mountains shown by hachures.

1913. Upper Licking Valley.

1913. Pond and Blackberry Creeks.

1913. Economic Industries; Boyd, Carter and Greenup.

1913. Maps (1), (2), (3) and (4) of the Upper Big Sandy Valley.

1913. Geology of Georgetown Quadrangle. Kentucky Geological Survey, Series IV, map packet of 1913.

1915. Map of Drainage of North Fork of Kentucky River between Hazard and Krypton, Ky., by L. M. Sellier. Black and white, scale 2 inches equals 1 mile. Coal openings and bench mark elevations shown. Kentucky Geological Survey, Series IV.

1916. Map of Western Coal Field (of Kentucky) showing areas underlaid by No. 9 coal. By L. M. Sellier. Scale: 1 inch=3 miles. Kentucky Geological Survey, Series IV.

1916. Geology of Shawneetown Quadrangle (in Kentucky). Kentucky Geological Survey, Series IV, map with report on Shawneetown quadrangle.

1919. Oil and Gas Pool and Pipe Lines of Kentucky, by W. R. Jillson.

1919. Kentucky-Appalachian Oil and Gas Fields, by W. R. Jillson.

GEOLOGICAL SECTIONS, DIAGRAMS, ETC.

1856. (1) Vertical diagram of lower coal measures in Anvil Rock down to the Battery Rock Coal. Kentucky Geological Survey, Vol. I, Series I, (Owen).

(2) Diagram of the coal measures penetrated with hollow borings 1,037 feet. Henderson county, Ky., Kentucky Geological Survey, Vol. I, Series I (Owen).

(3) Diagram of 740 feet of the lower coal measures and associate mill stone grit of Greenup and Carter Counties, showing coals numerous and interstratified rich iron ores, the whole resting on sub-Carboniferous limestone on Tigerts Creek. Kentucky Geological Survey, Vol. I, Series I (Owen).

(4) Vertical diagram of the coal measures of Harrison, Breckinridge and Meade Counties. Kentucky Geological Survey, Vol. I, Series I (Owen).

(5) Vertical diagram of lower coal measures and sub-carboniferous rocks of Edmonson County on (a) Nolin River, and (b) Dismal Creek. Kentucky Geological Survey, Vol. I, Series I (Owen).

1856. No. 2. Approximate section along the line of dip of the eastern coal measures exhibiting its lading members as they occur in Pulaski, Whitley, Laurel, Clay, Knox, Breathitt, Letcher, Floyd, Pike, and Johnson Counties, showing also the dislocation uplift and inclined position of the sub-carboniferous limestone, marly shales, and overlying conglomerate forming the Pine Mountain and equivalent ranges. The Kentucky Geological Survey, Vol. I. Series I, (Owen).

1856. Sections 1, 2, 3, 4 and 5 for Union County, Kentucky, as follows: Section 1, from Uniontown to the Ohio River; section 2, Highland Creek; section 3, Highland Creek; section 4, Highland Creek; section 5, Highland Creek. Black and white. Kentucky Geological Survey, Vol. I, Series I (Owen).

1861 Reconnaissance for the Eastern Kentucky coal field. Scale 12 miles equals 3 29/32 of an inch. The line runs southwestward from Grayson in Carter County through Morgan, Bath, Montgomery, Powell, Estill, Owsley, Jackson, Rockcastle, Pulaski, Wayne and Clinton, ending at the Tennessee line slightly southeast of Albany. By Joseph Leslie, Jr. Kentucky Geological Survey, Vol. IV., Series I (Owen).

1875. Horizontal section along L. P. & S. W. R. R. Vertical scale 1 inch equals 160 feet. Horizontal scale, 1 inch equals 1,600 feet. By Charles Norwood, 1875. Kentucky Geological Survey, Series II (Shaler).

1875. Preliminary section of Yellow Creek Valley to Livingston Station. Vertical scale, 200 feet equals 1 inch. Horizontal scale, 2,000 feet equals 1 inch. Black and white. By Charles J. Norwood. Kentucky Geological Survey, 1875. To accompany Part VI, Vol. II, Series II (Shaler).

1877. Geological section from Mt. Sterling, Ky. to the Chattarawa or Big Sandy River. By A. R. Crandall. Horizontal and vertical scales, 500 feet to the inch. Kentucky Geological Survey, 1877. To accompany Part X, Vol. II, Series II (Shaler).

1877. Cross section No. 1 from Leitchfield to Green River at Mammoth Cave. Black and white. Vertical scale, 160 feet equals 1 inch. Horizontal scale, 1,600 feet equals 1 inch. By P. N. Moore and J. R. Procter, 1877. Kentucky Geological Survey, Part II, Vol. II, Series II (Shaler) (1887).

1877. Cross section No. 2, Grayson Springs Station to Green River. Black and white. Vertical scale, 160 feet equals 1 inch. Horizontal scale, 1,600 feet equals 1 inch. Kentucky Geological Survey, Part II, Vol. II, Series II (1877).

1877. Cross section (No. 3) to accompany the report of P. N. Moore on the Edmonson Coal and Iron District. Vertical scale, 160 feet equals 1 inch. Horizontal scale, 1,600 feet equals 1 inch. Kentucky Geological Survey, 1877. To accompany Part II, Vol. II, Series II (Shaler).

(1890?) (a) General section from Little Bend of the Ohio above Concordia southeast to Muldraugh, Meade County. Vertical scale 1 inch=600 feet; horizontal scale 1 inch=2 miles.

(b) Section from Concordia, Big Springs, across Dry Valley Anticline western side of Meade County; in colors; vertical scale 1 inch=600 feet; horizontal scale 1 inch=2 miles by ———. (No date.)

(c) Section across Buras anticline; in colors; vertical scale, 1 inch=600 feet; horizontal scale, 1 inch=2 miles, by ———. (No. date.)

(d) General section of Rough Creek to Meade County line, in colors; vertical scale 1 inch=600 feet; horizontal scale, 1 inch=2 miles; by ———. (No date.)

(1890?) Section from Anderson County through Mercer and Garrard County sub-conglomerate coal of Rockcastle showing Kentucky anticlinal, and synclinal, in colors; vertical scale 1 inch=1,200 feet; hortizontal scale 1 inch=2 miles; by J. B. Hoeing.

1910 Section of the Tug Fork Region drawn by J. W. Norwood, 1910; vertical scale 2½ inches=500 miles; horizontal scale 1 inch=2 miles. Black and white.

1912 Eight (8) geological sections accompany the report on the Geology and Coals of Central City, Madisonville, Calhoun and Newburg quadrangles, by F. M. Hutchinson. Bulletin No. 19, in colors, of the Kentucky Geological Survey, Series III, 1912, as follows:

1. Central City Quadrangle cross section along line AB.
2. Central City Quadrangle cross section along line CD.
3. Madisonville Quadrangle cross section along line AB.
4. Madisonville Quadrangle cross section along line CD.
5. Calhoun Quadrangle cross section along line AB.
6. Calhoun Quadrangle cross section along line CD.
7. Unit cross section Newburg Quadrangle along line AB.
8. Unit cross section Newburg Quadrangle along line CD.

1917 Chart of section of Mississippian Rocks between Cincinnati anticline in Central Kentucky and Hardin County of Southeastern Illinois. Section arranged on the top of the Glen Dean limestone, black and white; vertical scale 4½ inches=400 feet (by Chas. Butts); prepared to accompany Report on the Mississipian Series of Western Kentucky, by Butts and Ulrich. Kentucky Geological Survey, Series IV. (No date.)

CHAPTER VII.

MAPS OF KENTUCKY BY COUNTIES.

(Most of the maps have been exhausted in edition and are out of print. For maps now available see list on page 207).

ADAIR COUNTY

(No date). Soil map of Adair County (Colored), by J. W. Norwood, del.; and S. C. Jones, Geol. Scale, 1 inch=2 miles. Ky. G. S., Series III, Norwood. A good map.
See Green County, Geological Map.

ALLEN COUNTY

1917. Map of Allen County, by L. M. Sellier. Base in black, drainage in blue, and oil and gas drilled wells in red. Scale, 1 inch=1 mile. Many elevations plotted. Ky. G. S., Series IV. Hoeing. An excellent map, now out of date.

1919. Map of Allen County, base by L. M. Sellier; Oil and gas development (drilled wells and pipe lines) elevations, by W. R. Jillson, Geol., correct to June 1, 1919. Scale, 1 inch=1 mile. Ky. G. S., Series V, Barton-Jillson. A fair map, now out of date.

1919. Geological map of Allen County (black and white), by A. M. Miller, Geol., shows some minor structures and drilled wells. Scale 1 inch=1 mile. Ky. G. S. Series V, Barton-Jillson. An excellent map.

ANDERSON COUNTY.

1923. Reconnaissance geographic map of Anderson County by J. L. Bissell and S. M. Mayfield. Scale, 1 inch=1 mile, black and white. Kentucky Geological Survey, Series VI, Jillson.

BALLARD COUNTY

See Miscl. Maps of Kentucky—Jackson's Purchase.

BARREN COUNTY

1919. Geological map of Barren County (black and white) by Charles Butts, Geol. Scale, 1 inch=2 miles. U. S. G. S. and Ky. G. S., Series V, Barton-Jillson.

1919. Oil and gas map of Barren County, Ky., by H. R. Merry, Dept. of Geology and Forestry of Kentucky. Series V, black and white; no scale. Published with Mineral and Forest Resources, Vol. 1, No. 3, 1919. A sketch map, locating farms generally.

BATH COUNTY

1875-76. Plan of part of Bath, Menifee, Montgomery, Powell, Wolfe, Morgan and Estill Counties. Surveyed and drawn by C. Schenk. 1875-1876. Boston. Scale, 4 13/16 inches=8 miles. Ky. G. S., Series II, Shaler. A geographic map, now out of print.

1866. Geological map of Bath and Fleming Counties; by J. B. Hoeing. Geol. by W. M. Linney. Scale, 1 inch=2 miles. Ky. G. S., Series II, Procter. Archives, State Museum, Lexington, Ky. Rare.

BELL COUNTY

1877. Map of a section of S. E. Kentucky and S. W. Virginia, (Bell and Harlan Counties, Ky.) By A. S. McCreath and E. V. D'Invilliers. Scale, 1 inch=5 miles. Map prepared by Ky. Geol. Survey, Series II, Procter.

BOONE COUNTY.

1923. Reconnaissance geographic map of Boone County, by J. L. Bissell. Scale, 1 inch=1 mile, black and white. Kentucky Geological Survey, Series VI, Jillson.

BOYD COUNTY

1876. See below, Greenup County, this date.

(1884?). Map of Boyd, Carter and Greenup Counties, by J. B. Hoeing and A. R. Crandall. Scale, 1 inch=2 miles. Ky. G. S., Series II, Procter.

1923. Map of structural geology of Boyd County, by J. S. Hudnall, black and white, scale 1 inch=1 mile. 10 foot contours on fire clay as keybed. Kentucky Geological Survey, Series VI, Jillson.

BOURBON COUNTY.

1923. Reconnaissance geographic map of Bourbon County, by J. L. Bissell, black and white, scale 1 inch=2 miles. Kentucky Geological Survey, Series VI, Jillson.

BOYLE COUNTY

(1882?). Map of Boyle and Mercer Counties; by J. B. Hoeing; Geol. by J. C. Fales and W. M. Linney, Geol. Scale, 1 inch=2 miles. Ky. G. S., Series II, Procter. Archives of State Museum, Lexington, Ky. Rare.

BRACKEN COUNTY.

1923. Reconnaissance geographic map of Bracken County (with Pendleton County), by J. L. Bissell. Scale, 1 inch=2 miles, black and white. Kentucky Geological Survey, Series VI, Jillson.

BREATHITT COUNTY

1919. Structural geology of Breathitt County (red and black), by Iley B. Browning. Scale, ¾ inch=1 mile. Ky. G. S., Series V, Barton-Jillson.

BRECKINRIDGE COUNTY

See below, Hancock County.
See below, Meade County.

CALLOWAY COUNTY

See Miscl. Maps of Kentucky. Jackson's Purchase.

CAMPBELL COUNTY

1923. Reconnaissance geographic map of Campbell County with Kenton County, black and white; scale, 1 inch=1 mile; by J. L. Bissell. Ky. Geo. Survey, Series VI, Jillson.

CARLISLE COUNTY

See miscl. maps of Kentucky—Jackson's Purchase.

CARROLL COUNTY

1923. Reconnaissance geographic map of Carroll County (with Gallatin County), black and white; scale, 1 inch=2 miles; by J. L. Bissell. Kentucky Geological Survey, Series VI, Jillson.

CARTER COUNTY

See above, Boyd County; also below, Greenup County.

CHRISTIAN COUNTY

1912. Soil map of Christian County (colored), by Risden T. Allen and T. M. Bushnell. Published by U. S. Dept. of Agriculture. Scale, 1 inch=1 mile. A Hoen & Co., Baltimore, Lith.
See Trigg County below.

CLARK COUNTY

See below, Montgomery County.

CLINTON COUNTY

(1890?). Map of Clinton County; by R. H. Loughridge and H. R. Ayers. (Geological). Scale, 1 inch=2 miles. Ky. G. S., Series II, Procter.

CRITTENDEN COUNTY

1915. Map of Crittenden County; by L. M. Sellier (geographic); scale, 1 inch=1 mile; blue and black. Shows elevations and prospect pits. Ky. Geol. Surv., Series IV, Hoeing.
See below, Union County.

CUMBERLAND COUNTY

1923. Map of Cumberland County, Kentucky, prepared under the direction of W. R. Jillson, by G. W. Pirtle, oil and gas development correct to Dec. 1, 1922. Black and white; scale, 1 inch=1 mile. Ky. G. S. Series VI., Jillson.

CUMBERLAND VALLEY

(1890?) Preliminary map of Upper Cumberland Valley. Scale 1 inch =5 miles. Ky. G. S., Series II, Procter.

ELLIOTT COUNTY

1886. Map of Elliott County (Areal Geology in Colors, with Section), by A. R. Crandall and J. B. Hoeing. Scale, 1 inch=2 miles. Ky. Geol. Survey, Series II, Procter. No date, inaccurate, rare.

ESTILL COUNTY

See above, Bath County.

FLEMING COUNTY

See above, Bath County.

FLOYD COUNTY

1922. Structural geology of Floyd County, Ky. (red and black), by J. S. Hudnall. Scale, 1 inch=1 mile. Contour interval 10 feet. Keybed, Van Lear-Prestonsburg Coal, Oil and Gas Wells and Pipe Lines. Ky. Geol. Survey, Series VI, Jillson.
Also see below, Morgan County.

FRANKLIN COUNTY

1914. Soil Map of Franklin County (colored), by S. C. Jones, Geol., and L. M. Sellier, del. Scale, 1 inch=1 mile. Ky. G. S., Series IV, Hoeing, and Ky. Agri. Experiment Station cooperating. A. Hoen & Co., Baltimore, Lith.

1914. Map of Franklin County (geological), by L. M. Sellier and A. M. Miller; colored; scale 1 inch=1 mile. Ky. Geol. Survey, Series IV, 1914, Hoeing.

GALLATIN COUNTY

1923. Reconnaissance geographic map of Gallatin County (with Carroll County); 1 inch=2 miles; by J. L. Bissell. Kentucky Geological Survey, Series VI, Jillson.

GARRARD COUNTY

(1882?). Map of Garrard County, by J. B. Hoeing; Geol. by W. M. Linney. Scale, 1 inch=2 miles. Ky. G. S., Series II, Procter.

GRANT COUNTY

1923. Reconnaissance geographic map of Grant County; scale 1 inch=1 mile; was prepared by F. W. Bertsch for the Kentucky Geological Survey, Series VI, Jillson.

GRAVES COUNTY

See Miscl. Map of Kentucky—Jackson's Purchase.

GRAYSON COUNTY

See below, Hancock County.

GREEN COUNTY

(No date). Soil Map of Green County (colored), by J. W. Norwood, del.; and S. C. Jones, Geol. Scale, 1 inch=2 miles. Ky. G. S., Series III, Norwood.

Map of Green, Taylor and Adair Counties. Reconnaissance geological in colors, by J. W. Norwood, del.: and A. M. Miller, Geologist. Scale, 1 inch=2 miles. Series III, Norwood.

GREENUP COUNTY

1857. Map exhibiting the topographical and geol. features of part of Greenup, Carter and Lawrence Counties. D. D. Owen, principal geologist; S. S. Lyon, topographical assistant. Field work by E. Mylotte, Map by E. Mylotte and P. O. Beirne. Scale, 1 inch=1 mile. Ky. G. S., Series I, Map No. 3, Owen.

1876. Map of counties of Greenup, Carter and Boyd, and a part of Lawrence. Topography by C. Schenk and W. Mitchell. Scale, 1 inch=2 miles. Ky. G. S., Series II, Shaler.

1884. See above, Boyd County, this date.

HANCOCK COUNTY

(1878) Map of Hancock County and parts of Ohio, Grayson and Breckinridge, showing eastern outline of Western Coal Field; by P. N. Moore and W. B. Page, aided by Hoeing, Underwood and Cole. Scale, 1:60,000. Sheet I to accompany parts X and XII, Vol. IV, Ky. G. S., Series II, Shaler.

(1878). Map of Hancock County, and parts of Ohio, Grayson and Breckinridge, showing eastern outline of Western Coal Field (Sheet 2). Geology by P. N. Moore; Topography by W. B. Page, aided by J. B. Hoeing, Eugene Underwood and M. S. Cole. Scale 1:60,000. A geographic map now exhausted in edition. To accompany Parts X, XII, Vol IV, Ky. G. S., Series II, Shaler.

HARLAN COUNTY

(1887). See above, Bell County, this date.

HARRISON COUNTY

1923. Reconnaissance geographic map of Harrison County; scale 1 inch=1 mile, black and white, by J. L. Bissell. Kentucky Geological Survey, Series VI, Jillson.

HART COUNTY

1923. Reconnaissance geographic map of Hart County; scale 1 inch=2 miles; black and white; was prepared by J. L. Bissell, for the Kentucky Geological Survey, Series VI, Jillson.

HENRY COUNTY

(1887?). Map of Henry, Shelby and Oldham Counties; by J. B. Hoeing, del.; and W. M. Linney, Geol. Scale, 1 inch=2 miles. Ky. G. S., Series II, Procter.

HICKMAN COUNTY

See Miscl. Kentucky Maps—Jackson's Purchase.

HOPKINS COUNTY

1857. Map No. 2, Hopkins County, by Sidney S. Lyon. Ky. Geol. Survey, Series I, Owen.

1923. Map of geology of Hopkins County, Ky., by W. R. Jillson, A. F. Crider, F. M. Hutchinson and J. S. Hudnall; scale, 1 inch=1 mile. Oil and gas development correct to June 1, 1923.

JACKSON COUNTY

1891. Sketch map of parts of Jackson and Rockcastle Counties, by G. M. Sullivan; colored; scale, 1 inch=2 miles. Kentucky Geological Survey, Series II, Procter.

JEFFERSON COUNTY

1917. Geological map of Jefferson County; scale, 1 inch=1 mile; in colors; was prepared by Charles Butts, and published by the Kentucky Geological Survey, Series IV (Hoeing) and the U. S. Geological Survey in co-operation.

JOHNSON COUNTY

1921. Oil and gas structural geological map of Johnson County; 1 inch=1 mile; was prepared by I. B. Browning, keybed, Fire Clay Coal, contour interval 10 ft. Kentucky Geological Survey, Series VI, Jillson.

KENTON COUNTY

1923. Reconnaissance geographic map of Kenton County with Campbell County; scale 1 inch=1 mile; by J. L. Bissell, published by the Kentucky Geological Survey, Series VI, Jillson.

KNOTT COUNTY

1919. Map of the structural geology of Knott County; scale 1 inch=1 mile; by I. B. Browning, 10 ft. contours, Keybed, Fire Clay Coal, and published by the Department of Geology and Forestry of Kentucky.

LAWRENCE COUNTY

1923. Map of Lawrence County showing the oil and gas structure, by J. S. Hudnall, 10 feet contours on Fire Clay Coal. The Kentucky Geological Survey, Series VI, Jillson.

LESLIE COUNTY

1923. Structural geology of Leslie County, Kentucky, by J. S. Hudnall, C. V. Theis and George W. Morris, black and white; scale, 1 inch =1 mile. Oil and gas development correct to Sept. 1, 1923. Ky. Geol. Survey, Series VI, Jillson.

LETCHER COUNTY

1915. Map of Letcher County showing geologic structure by L. M. Sellier and A. F. Crider; scale, 1 inch=1 mile. Keybed Fire Clay Coal. Kentucky Geological Survey, Series IV, Hoeing.

1915. Map showing Fire Clay and Elkhorn Coals, by L. M. Sellier and A. F. Crider; scale, 1 inch=2 miles.

LINCOLN COUNTY

(No date) Map showing the geology of Lincoln County, in colors; scale 1 inch=2 miles; by J. B. Hoeing and W. M. Linney; was published by the Kentucky Geological Survey, Series II.

LIVINGSTON COUNTY

1923. Geographical Reconnaissance map of Livingston County (with Lyon); black and white; scale, 1 inch=2 miles; was prepared by J. L. Bissell and published by the Kentucky Geological Survey, Series VI, Jillson.

LOGAN COUNTY

1919. Soil map of Logan County, Ky.; Grove B. Jones, L. R. Schoenmann, S. D. Averitt; scale, 1 inch=1 mile; colored; U. S. Dept. of Agriculture.

MADISON COUNTY

(18?). Map of Madison County; by J. B. Hoeing, del.; and John R. Procter, Geol.; colored; scale, 1 inch=2 miles. Ky. G. S., Series II, Procter.

MAGOFFIN COUNTY

1917. Geographic map of Magoffin County; scale, 1 inch=1 mile; was prepared by L. M. Sellier and published by the Kentucky Geological Survey, Series IV, Hoeing.

1917. Oil and gas structural map of Magoffin County; scale 1 inch=2 miles; showing structure; was prepared by L. M. Sellier, contour interval 20 feet, keybed Fire Clay Coal, and published by the Kentucky Geological Survey, Series IV, Hoeing.

1921. Map of the Structural Geology of Magoffin County, Kentucky, by I. B. Browning. Scale, 1 inch=1 mile. Contour interval 10 feet. Keybed Fire Clay Coal, Oil and Gas Wells and Pipe Lines. Ky. Geol. Survey, Series VI, Jillson.

Also see below, Morgan County.

MARION COUNTY

See Washington and Marion Counties below.

MARSHALL COUNTY

See Miscl. Maps of Kentucky—Jackson's Purchase.

MARTIN COUNTY

1923. Structural geology of Martin County, Ky. (black and white), by J. S. Hudnall. Scale, 1 inch=1 mile. Contour interval 10 feet. Oil and Gas Wells and Pipe Lines. Ky. Geol. Survey, Series VI, Jillson.

See below, Morgan County.

MASON COUNTY

(1885?). Map of Mason County, by J. B. Hoeing. Scale, 1 inch=2 miles. Ky. G. S., Series II, Procter.

1903. Soil Map of Mason County (colored), by R. T. Avon Burke. Pub. U. S. Dept. of Agriculture. Scale, 1 inch=1 mile. A. Hoen & Co., Baltimore, Lith.

McCRACKEN COUNTY

See Miscl. Maps of Kentucky—Jackson's Purchase.

McCREARY COUNTY

1889. An old geological map of Whitley County, was prepared by J. B. Hoeing and A. R. Crandall in 1889. This map was published by the Kentucky Geological Survey, Series II. The eastern part of McCreary County is shown on this map which is now out of print and rare.

See Whitley County below.

MENIFEE COUNTY

See above, Bath County.

MEADE COUNTY

1891. Map of Meade and Breckinridge Counties, by J. B. Hoeing, del., and R. H. Loughridge; colored; scale, 1 inch=2 miles. Ky. G. S., Series II, Procter.

1891. Map of Meade County gas wells, by R. H. Loughridge; colored; scale, 1 inch=2 miles. Geol. Ky. G. S., Series II. Procter.

1891. Generalized Geologic Sections (2 plates) showing anticlines in Meade and Breckinridge Counties, by J. B. Hoeing and R. H. Loughridge, Geol., Ky. G. S., Series II, Procter.

MERCER COUNTY

See above, Boyle County.

METCALFE COUNTY

1923. Map of Metcalfe County, Kentucky, prepared under the direction of W. R. Jillson, by H. D. Crider. Oil and gas development correct to Sept. 1, 1923. Black and white; scale, 1 inch=1 mile. Ky. Geol. Survey, Series VI, Jillson.

MONROE COUNTY

1923. Map of Monroe County, Kentucky; prepared under the direction of W. R. Jillson, by G. W. Pirtle. Oil and gas development correct to Sept. 1, 1923. Black and white; scale, 1 inch=1 mile. Ky. Geol. Survey, Series VI, Jillson.

MONTGOMERY COUNTY

1887. See above, Bath County, this date.

(1884?). Map of Montgomery and Clark Counties, by J. B. Hoeing, J. C. Fales and W. M. Linney, Geol.; colored; scale, 1 inch=2 miles. Ky. G. S., Series II, Procter.

MORGAN COUNTY

(No date). Map of Morgan and Johnson Counties, and parts of Magoffin, Floyd and Martin. Geology by A. R. Crandall. No scale or date. Ky. Geol. Surv., Series II, Procter. Archives, State Museum, Lexington, Ky.

See above, Bath County.

NELSON COUNTY

See below, Spencer County.

OHIO COUNTY

See above, Hancock County.

OLDHAM COUNTY

See above, Henry County.

OWEN COUNTY.

1923. Reconnaissance geographic map of Owen County, by F. W. Bertsch; scale, 1 inch—1 mile, black and white. Oil and gas and lead development corrected to Sept 1, 1923. Kentucky Geological Survey, Series VI, Jillson.

PENDLETON COUNTY.

1923. Reconnaissance geographic map of Pendleton County (with Bracken County), by J. L. Bissell. Scale, 1 inch=2 miles, black and white. Kentucky Geological Survey, Series VI, Jillson.

PERRY COUNTY

1923. Structural geology of Perry County, Kentucky; black and white; by J. S. Hudnall. Scale, 1 inch=1 mile. Oil and gas development correct to Sept. 1, 1923. Ky. Geol. Survey, Series VI, Jilson.

PIKE COUNTY

1923. Structural geology of Pike County, Ky. (black and white), by J. S. Hudnall. Scale, 1 inch=1 mile. Contour interval 10 feet. Keybed Van Lear Coal, Oil and Gas Wells and Pipe Lines. Ky. Geol. Survey, Series VI, Jillson.

POWELL COUNTY

See above, Bath County.

ROCKCASTLE COUNTY

1910. Soil Map of Rockcastle County (colored and contoured), by R. T. Burke, Frank Bennett and Clarence Lounsbury. Scale, 1 inch=1 mile, contour interval 100 feet. U. S. G. S. Base. Pub. by U. S. Dept. of Agriculture. A. Hoen & Co., Baltimore, Lith.

See above, Jackson County.

ROWAN COUNTY

1913. A portion of Rowan County, contained in Ky. Geol. Survey, Series IV, Map packet, 1913.

SCOTT COUNTY

1903. Soil map of Scott County, Ky., by R. T. Avon Burke, U. S. Dept. of Agriculture. Scale, 1 inch=1 mile; colored.

SHELBY COUNTY

See above, Henry County.

1916. Soil map of Shelby County (colored), by Cornelius Van Duyne, L. R. Schoenmann and S. D. Averitt. U. S. Dept. of Agri. and Ky. Agri. Experiment Station cooperating. Scale, 1 inch=1 mile. A. Hoen & Co., Baltimore, Lith.

SPENCER COUNTY

(1884?). Map of Spencer and Nelson Counties; by J. B. Hoeing, del.; and W. M. Linney, Geol. Scale, 1 inch=2 miles. Ky. G. S.. Series II, Procter.

TAYLOR COUNTY

(No date). Soil Map of Taylor County (colored), by J. W. Norwood, del.; and S. C. Jones, Geol. Scale, 1 inch=2 miles. Ky. G. S., Series III, Norwood.

See Green County, Geological Map.

TRIGG COUNTY

Map of Trigg and Christian Counties (black and purple geologic), by J. B. Hoeing, del.; and F. J. Fohs, Geologist. No date. Scale, 1 inch=2 miles. Ky. G. S., Series III, Norwood.

UNION COUNTY

1885. Map exhibiting the topographical and geological features of Union and part of Crittenden Counties. D. D. Owen, principal geologist; S. S. Lyon, topographical asst. Scale, 1:2672. Ky. G. S., Series I, Owen.

1902. Soil Map of Union County (colored), by Herbert W. Marean. Pub. U. S. Dept. of Agriculture. Scale, 1 inch=1 mile. A. Hoen & Co., Baltimore, Lith.

WARREN COUNTY

1904. Soil map of Warren County (colored), by Thomas D. Rice and W. J. Greib. Pub. U. S. Dept of Agriculture; scale, 1 inch=1 mile. A Hoen & Co., Baltimore.

1919. Oil and Gas Map of Warren County (black and white), by W. R. Jillson, Geol. Scale, 1 inch=2 miles. Ky. G. S., Series V, Barton-Jillson.

1891. Map of Warren County (colored geological), by J. E. McAdoo; Geology by J. B. Hoeing. Scale, 1 inch=2 miles. 2 Geologic sections. Ky. G. S., Series II, Procter.

WASHINGTON COUNTY

(1882?). Map of Washington and Marion Counties, by J. B. Hoeing, del.; and W. M. Linney and W. T. Knott, Geologists. Scale, 1 inch=2 miles. Ky. G. S., Series II, Procter.

WAYNE COUNTY

(No date). Map of Wayne County, by H. R. Ayers. Scale, 1 inch=2 miles. Ky. G. S., Series II, Procter.

WEBSTER COUNTY

(No date). Soil Map of Webster County (colored and contoured), by J. W. Norwood, del.; and S. C. Jones, Geol. Scale, 1 inch=2 miles, 50 ft. contours. Ky. G. S., Series III, Norwood. A. Hoen & Co., Baltimore, Lith.

WHITLEY COUNTY

1889. Map of Whitley County (and parts of Pulaski, Laurel and Bell Counties), colored geologic; by J. B. Hoeing, del.; and A. R. Crandall, Geol. Scale, 1 inch=2 miles. Ky. G. S., Series II, Procter. Includes eastern McCreary County.

WOLFE COUNTY

See above, Bath County.

WOODFORD COUNTY.

1923. Geological map of Woodford County, by A. M. Miller, black and white. Scale, 1 inch=1 mile. Kentucky Geological Survey, Series VI, Jillson.

CHAPTER VIII.

STATUS OF MAPPING IN KENTUCKY COUNTIES

A review of all the geological literature and maps published with respect to areas in Kentucky reveals the fact that although the principal portion of this State has been covered one way or another by one or more of the several Geological Surveys, there are some considerable portions of the State which have not as yet been mapped in any way. About one-half of the State has been completed topographically yet after adding this large area to what Kentucky has done alone, it is found that there are sixteen (16) counties for which no official maps of any kind have been prepared. These are: Bullitt (southern part); Casey; Hardin; Larue; Lewis; McCreary (western part); Nicholas; Pulaski (western part); Robertson; Rowan; Russell; Simpson; Todd; and Trimble.

The greater portion of the State has been mapped by reconnaissance methods generally to the scale of 1 inch equals 2 miles, and the general geology for this large region has been executed. The names of the counties which have been mapped geologically are given herewith, though many of the maps have been out of print for a number of years: Adair; Allen; Ballard; Barren; Bath; Bell (in part); Boyd; Boyle; Breathitt; Breckinridge; Butler (Southern part); Caldwell (Southern part); Calloway; Carlisle; Carter; Christian; Clarke; Clay (Northwestern part); Clinton; Elliott; Fayette; Fleming; Floyd; Franklin; Fulton; Garrard; Graves; Green; Greenup; Harlan; Henry; Hickman; Hopkins; Jackson; Jefferson; Jessamine; Johnson; Knott; Laurel (Western part); Lawrence; Lee; Leslie; Letcher; Lincoln; Livingston (Northern part); Logan (Northern tip); Madison; Marion; Marshall; Martin; Mason; Meade; Mercer; Montgomery; Muhlenberg; McCracken; McCreary (Eastern part); McGoffin; McLean (Western and Southern part); Nelson; Perry; Pike; Pulaski (Eastern part); Rockcastle; Spencer; Scott (in part); Taylor; Trigg; Union (Western part); Warren; Washington; Wayne; Webster; Whitley; and Woodford. Of a lesser area than that which has been mapped geologically is the region which has been covered by reconnaissance geographic maps. Some of the source materials for these maps were old surveys instituted as the result of private enterprise, and in many cases the roads have been somewhat altered since the original maps were prepared. The following thirty-two (32) counties have been geographically mapped: Anderson; Boone; Bourbon; Bracken; Breckinridge (in part); Campbell; Carroll; Crittenden; Cumberland; Estill (in part); Floyd (in part); Gallatin (oil and gas); Grant; Grayson (in part) (out of print); Hancock (out of print); Harrison; Hart; Hopkins (out of print); Kenton; Livingston; Lyon; Menifee (in part, and out of print); Metcalfe (oil and gas); Monroe (oil and gas); Morgan (in part, and out of print); Ohio (in part) (out of print); Owen (oil and gas); Pendleton; Pike (in part); Powell (in part) (out of print); Scott; and Wolfe (in part, and out of print). Many of the above maps were prepared a number of years ago, and are now out of print and very rare.

A considerable amount of soil mapping has been done in Kentucky, and the work has been well distributed throughout the state, with the exception of the mountains of Eastern Kentucky, where, excluding Rockcastle County which is a Western border county and has been mapped, there are no soil maps of any county. The following twenty-two (22) counties have been mapped to show their various soils: Adair; Ballard; Calloway; Carlisle; Christian; Franklin; Fulton; Graves; Green; Hickman; Jessamine; Logan; Marshall; Mason; McCracken; Rockcastle; Scott; Shelby; Taylor; Union; Warren (out of print); and Webster. Some of these maps are available from the Kentucky Geological Survey, and others from the U. S. Department of Agriculture, Washington, D. C.

A summary statement of the mapping completed to date, by counties, has been prepared and is given herewith. The counties have been arranged alphabetically to facilitate the work of the investigator.

ADAIR COUNTY

A soil map of Adair County in colors, scale 1 inch=2 miles; by S. C. Jones and J. W. Norwood is available.

A geological map of Adair County, scale 1 inch=2 miles, by A. M. Miller, has been issued together with Green and Taylor Counties, but is now exhausted in edition. (See Green County Geological Map.) The topography has not been run. See Green County.

ALLEN COUNTY

A colored geographical map of Allen County, scale 1 inch=1 mile, by L. M. Sellier, was issued by the Kentucky Geological Survey in 1919. This map is now exhausted in edition.

An oil and gas map of Allen County, scale 1 inch=1 mile, by L. M. Sellier and W. R. Jillson, was issued by the Kenucky Geological Survey in 1919. This map is now exhausted in edition.

A geological map of Allen County, scale 1 inch=1 mile, with black and white symbols, was presented by A. M. Miller in 1919, and is now available from the Kentucky Geological Survey. The topography of Allen County is found in part on the Bowling Green sheet which is available. The topography of Scottsville region is now being run.

ANDERSON COUNTY

A geographic map of Anderson County, scale 1 inch=1 mile, is now in preparation by the Kentucky Geological Survey. The region about Lawrenceburg is shown on the Frankfort topographic sheet, scale 1:62500. The southeastern tip of the county is shown on the Harrodsburg sheet, scale 1:125000, and the northwestern part of the county is shown on the new Shelbyville sheet, scale 1:62500, all of which are available except the latter which is now being surveyed.

BALLARD COUNTY

This county has never been separately mapped, but is included in a large geological map of the Jackson Purchase Region, scale 1 inch=2 miles, by R. H. Loughridge, J. B. Hoeing and H. R. Ayers, which was issued by the Kentucky Geological Survey in 1885, and is still available.

Ballard County is also shown on a soil map of the Jackson Purchase Region, scale 1:300000, by R. H. Loughridge and J. B. Hoeing, issued by the Kentucky Geological Survey in 1886. The topography has not been executed.

BARREN COUNTY

An oil and gas map of Barren County, 1 inch=2 miles, was prepared by H. R. Merry, and was issued by the Kentucky Geological Survey in 1919. It is now exhausted in edition.

A geological map of Barren County, scale 1 inch=2 miles, using black and white symbols, was prepared by Charles Butts and was issued by the Kentucky Geological Survey and the U. S. Geological Survey in co-operation in 1919. This map is still available from the Kentucky Geological Survey.

The topography or Northwestern Barren County, which is now available, is found on the Mammoth Cave sheet, scale 1:62.500. The topography of the southwestern portion of this county is now being surveyed.

BATH COUNTY

A geological map of Bath County (including Fleming County), scale 1 inch=2 miles, by J. B. Hoeing and W. H. Linney, was issued by the Kentucky Geological Survey in 1886. This map is exhausted in edition.

Another map showing portions of Menifee, Montgomery, Powell, Wolfe, Morgan and Estill Counties, scale 4 13/16 inches=8 miles, was prepared by C. Schenk, and published by the Kentucky Geological Survey in 1875-76. This map is exhausted in edition. There is no topographic map for Bath County.

BELL COUNTY

No county map has ever been made for Bell County, but the geology of the portion southeast of Pine Mountain has been executed by George Ashley and L. C. Glenn, U. S. G. S., P. P. No. 49. The county is completely surveyed, topographically, on the Williamsburg, Cumberland Gap and Jonesville sheets, all scale 1:125,000, and the Harlan sheet, scale 1:62,500.

A map of a portion of southeastern Kentucky and southwestern West Virginia, scale 1 inch=5 miles, by McCreath and D'Invilliers, showing Bell County with Harlan County. Was published by the Kentucky Geological Survey in 1887. This map is no longer available.

BOONE COUNTY

A reconnaissance map of Boone Coupnty, scale 1 inch=1 mile, has been published by the Sixth Kentucky Geological Survey and is available. This county has also been surveyed by private enterprise. The region surrounding Burlington has been topographically surveyed and is shown on the Cincinnati double sheet, scale 1:62500, which may be secured from the Kentucky Geological Survey.

BOURBON COUNTY

A reconnaissance map of Bourbon, scale 1 inch=2 miles, has been prepared by the Kentucky Geological Survey and is available. A map was also prepared some years ago by private enterprise. The county is not surveyed topographically.

BOYD COUNTY

A structural map of Boyd County, prepared by J. S. Hudnall, was issued by the Kentucky Geological Survey in 1923. The topography has been executed, scale 1:125,000, and is available on the Kenova sheet. The geology of Boyd County has also been mapped on this same quadrangle and is shown in the Kenova folio which is exhausted in edition.

The geology of Boyd County was executed by J. B. Hoeing on a map showing Boyd, Carter and Greenup Counties, scale 1 inch=2 miles, and was issued by the Kentucky Geological Survey about 1884. This map has been exhausted in edition for a number of years.

BOYLE COUNTY

Boyle County has been mapped geologically, scale 1 inch=2 miles, by J. B. Hoeing, J. C. Fales and W. M. Linney. This map was published by the Kentucky Geological Survey as a unit with Mercer County about 1882. This map is rare. With exception of a small strip along the western border, Boyle County is completely surveyed topographically, scale 1:125000, and is available on the Harrodsburg sheet.

BRACKEN COUNTY

A reconnaissance map of Bracken County has been issued by the Sixth Kentucky Geological Survey, scale 1 inch=1mile. The county was also mapped by private enterprise some years ago. The topography has never been executed.

BREATHITT COUNTY

The oil and gas structural geology of Breathitt County has been mapped, scale ¾ inch=1 mile, by I. B. Browning, and issued by the Department of Geology and Forestry of Kentucky in 1919. This structural map is now available. The topography of Breathitt County has been completed and is available on the Salyersville, Beattyville and Manchester Quadrangles, all scale 1:125000; and on the Buckhorn, Troublesome and Prestonsburg sheets, scale 1:62500.

BRECKINRIDGE COUNTY

This county was first mapped, geographically, in connection with Hancock and parts of the adjoining counties, Ohio and Grayson, scale 1:60,000, by Moore, Page, Hoeing, Underwood and Cole, in 1878, and issued by the Kentucky Geological Survey, Series II; but this map is now exhausted in edition.

A geological map of Breckinridge County was later prepared by J. B. Hoeing and R. H. Loughridge, and published by the Kentucky Geological Survey, Series II, in 1891, in colors, as a unit with Meade County, scale 1 inch=2 miles. This map is still available.

Breckinridge County has never been surveyed topographically.

BULLITT COUNTY

No unit map has been published showing Bullitt County. The topography has been exhausted, however, for the northern portion of the county, and is available on the Kosmosdale and Louisville sheets, scale 1:62500.

BUTLER COUNTY

Butler County has never been mapped as a unit, but topographic sheets covering the entire county are now available. These are the following: Hartford, Horse Branch, Brownsville, Little Muddy and Dunmor sheets, all scale 1:62500. The geology of the Dunmor and Little Muddy sheets has been executed in part and issued with Series IV, Volume 3, Part 1, in 1915.

An economic report on the geology of the Hartford quadrangle without map was published by the Kentucky Geological Survey, series III, in 1912. This report is available.

CALDWELL COUNTY

No unit map of Caldwell county has been published, but the topography of this county with the exception of the extreme western and southern sections has been executed on the Princeton, Dawson Springs, Providence and Cave-in-Rock quadrangles, all scale 1:62500.

The geology of the Princeton quadrangle has been executed and is available in Series VI, Volume 10 (1923), Kentucky Geological Survey. The geology of the Dawson Springs quadrangle has been published and is available in Series IV, Volume 2, Part 1, Kentucky Geological Survey. The geology of the Cave-in-Rock quadrangle which merely touches the northwestern portion of Caldwell county is now being executed.

CALLOWAY COUNTY

This county has never been separately mapped, but is included in the large geological map of the Jackson Purchase Region, scale 1 inch=2 miles, by R. H. Loughridge, J. B. Hoeing and H. R. Ayers, which was issued by the Kentucky Geological Survey, Series II, in 1885, and is still available.

Calloway County is also shown on the soil map of the Jackson Purchase Region, scale 1:300,000, by R. H. Loughridge and J. B. Hoeing, issued by the Kentucky Geological Survey, Series II, in 1886. The topography of Calloway County has never been surveyed.

CAMPBELL COUNTY

A reconnaissance geographic map of Campbell County is now in preparation by the Kentucky Geological Survey, Series VI, in black and white, scale 1 inch=1 mile. The northern portion of the county has been run in topographically on the Cincinnati double sheet, scale 1:62,500. The geology of this county has never been published.

CARLISLE COUNTY

This county has never been separately mapped, but is included in the large geological map of the Jackson Purchase Region, scale 1 inch

=2 miles, by R. H. Loughridge, J. B. Hoeing and H. R. Ayers, which was issued by the Kentucky Geological Survey, Series II, in 1885, and is still available.

Carlisle County is also shown on the soil map of the Jackson Purchase Region, scale 1:300,000, by R. H. Loughridge and J. B. Hoeing, issued by the Kentucky Geological Survey, Series II, in 1886. The topography of Carlisle County has never been surveyed.

CARROLL COUNTY

A reconnaissance geographic map of Carroll County is now in preparation by the Kentucky Geological Survey, Series VI, in black and white, scale 1 inch=1 mile. No topography has been executed for Carroll County.

CARTER COUNTY

A map showing the geology of Carter County combined with Boyd and Greenup Counties, scale 1 inch=2 miles, was prepared by J. B. Hoeing and A. R. Crandall about 1884, and was published by the Kentucky Geological Survey, Series II.

At an earlier date, a map of Greenup, Carter and Boyd Counties, including part of Lawrence County, had been executed topographically to the scale 1 inch=2 miles by C. Schenk and W. Mitchell for the Kentucky Geological Survey, Series II.

In 1857, under the direction of David Dale Owen, S. S. Lyon, E. Mylotte and P. O. Beirne executed the first map of a part of Carter County. It was a topographic map, and the first ever made for Kentucky, using contours to express topography. Besides Carter County this map exhibited a considerable portion of Greenup and Lawrence Counties, scale 1 inch=1 mile. Kentucky Geological Survey, Series I.

Modern topography as executed by the Kentucky Geological Survey and the U. S. Geological Survey in co-operation has never been run for Carter County.

CASEY COUNTY

No map has ever been prepared or published for Casey County. The topography of this section has never been executed.

CHRISTIAN COUNTY

The geology of Christian County has been mapped with Trigg County, in black and white, scale 1 inch=2 miles, by J. B. Hoeing and F. J. Fohs, and published by the Kentucky Geological Survey, Series III. This map is now available.

A soil map of Christian County, in colors, scale 1 inch=1 mile, was prepared by R. T. Allen and T. M. Bushnell, and published by the U. S. Department of Agriculture in 1912. This map is ready for distribution. The topography for the northern part of Christian County is available on the Dawson Springs, Nortonville and Drakesboro quadrangles, all to the scale of 1:62500.

CLARK COUNTY

The geology of Clark County, together with that of Montgomery, in colors, scale 1 inch=2 miles, was prepared by J. B. Hoeing, J. C. Fales and W. M. Linney, and issued by the Kentucky Geological Survey, Series II, 1884. This map is available.

More recently the U. S. Geological Survey, Richmond folio No. 46 (944 square miles), showing the geology of the southern half of Clark County, including Winchester, has been published. The topography for the same portion of Clark County is available on the Richmond sheet, scale 1:125,000, but the eastern tip of the county is found on the Beattyville sheet, scale 1:125,000. The northern part of the county from Winchester to the Bourbon County line has never been topographically surveyed.

CLAY COUNTY

No map of Clay County has ever been prepared, but the topography of the entire county is available on the Manchester and Cumberland Gap sheets, both to the scale of 1:125,000.

CLINTON COUNTY

The geology of Clinton County was executed by R. H. Loughridge and H. R. Ayers, in colors, scale 1 inch=2 miles, and published by the Kentucky Geological Survey, Series II, about 1890.

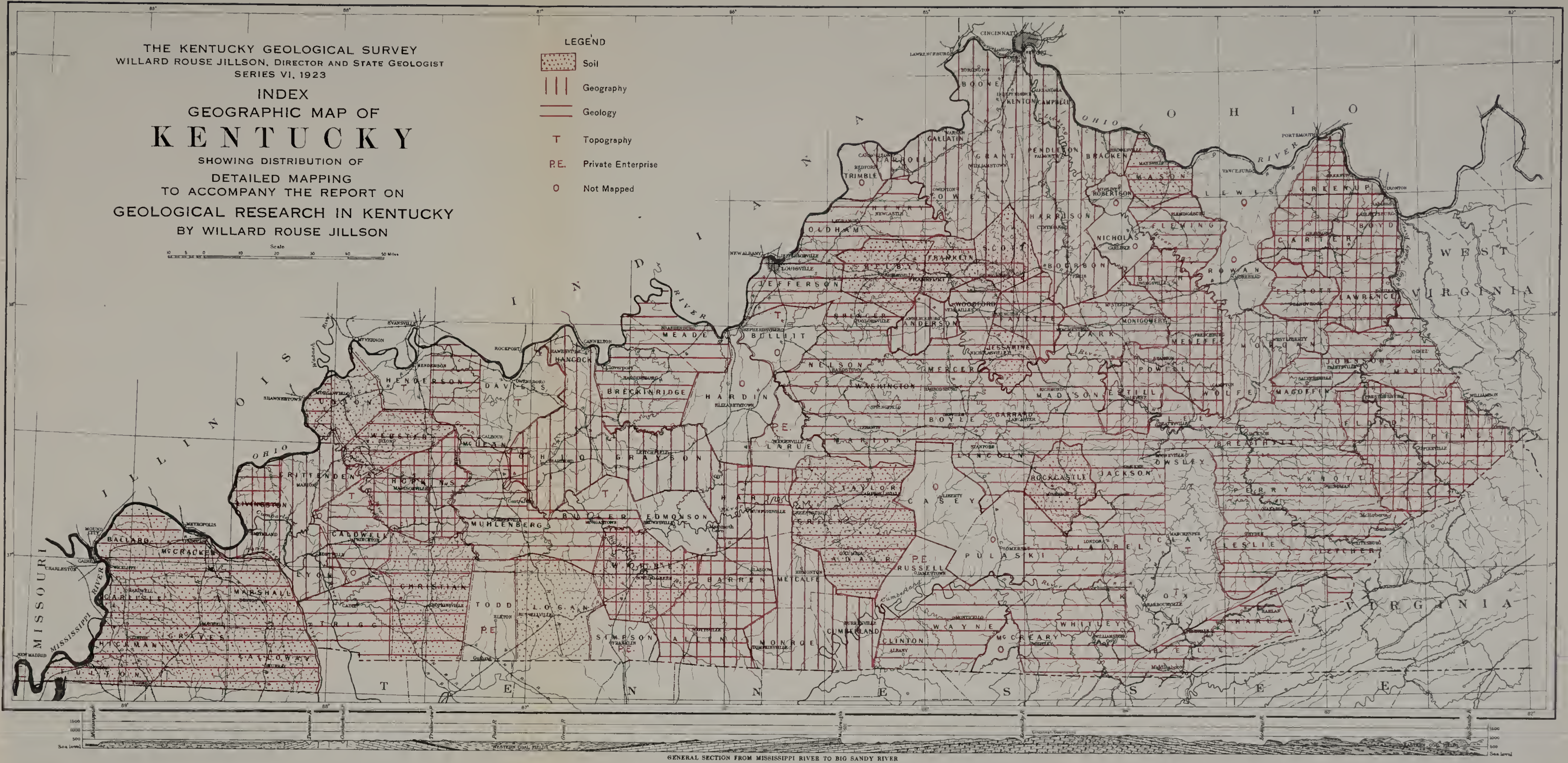
Excepting a very small portion of the county along the Wayne County line, which is found on the Monticello sheet, scale 1:62,500, Clinton County is not surveyed topographically. No geographic maps or soil maps have ever been prepared for this county.

CRITTENDEN COUNTY

A geographical map of Crittenden County, with blue drainage, scale 1 inch=1 mile, prepared by L. M. Sellier, showing elevations, prospect pits, etc., was issued by the Kentucky Geological Survey, Series IV, in 1915.

The topography of Crittenden County is available on the Golconda, the Cave-in-Rock, Shawneetown and Providence quadrangle, all to the scale of 1:62,500.

The geology of the northwestern portion of Crittenden County is available on the Golconda quadrangle, scale 1:62,500, which has been published, and the geology of the region about Marion on the Cave-in-Rock sheet, scale 1:62,500, is now in progress. The easternmost portion of the county is found on the Providence sheet, scale 1:62,500, has never been mapped geologically, but the smaller northern tip of the county on the Shawneetown quadrangle, scale 1:62,500, has been geologically mapped.



THE KENTUCKY GEOLOGICAL SURVEY
WILLARD ROUSE JILLSON, DIRECTOR AND STATE GEOLOGIST
SERIES VI, 1923

INDEX
GEOGRAPHIC MAP OF
KENTUCKY
SHOWING DISTRIBUTION OF
DETAILED MAPPING
TO ACCOMPANY THE REPORT ON
GEOLOGICAL RESEARCH IN KENTUCKY
BY WILLARD ROUSE JILLSON

GENERAL SECTION FROM MISSISSIPPI RIVER TO BIG SANDY RIVER

CUMBERLAND COUNTY

An oil and gas geographic reconnaissance map of Cumberland County, black and white, scale 1 inch=1 mile, was prepared by G. W. Pirtle, and published by the Kentucky Geological Survey, Series VI, 1923. No other map is available for this section, the topography never having been executed.

DAVIESS COUNTY

The Survey has never published a unit county map for Daviess County, but the topography for the entire county is available on the following sheets, all to the scale of 1:62,500: Newburg, Owensboro, Tell City, Whitesville, Sutherland and Calhoun.

The geology of western Davies County has been executed on the Newburg and Calhoun quadrangles which were published in Bulletin No. 19, by the Kentucky Geological Survey, Series III, in 1912. These maps are now available.

EDMONSON COUNTY

No map of Edmonson County has ever been prepared by the Kentucky Geological Survey, but the topography of the entire county is available on the following sheets the scale of each being 1:62,500: Leitchfield, Cub Run, Mammoth Cave and Brownsville.

A sketch map for the Nolin River Region was prepared by the Kentucky Geological Survey, Series IV, and published in Vol. 2, Part 1, in 1914. This report and map are both out of print.

ELLIOTT COUNTY

A geologic map of Elliott County, in colors, scale 1 inch=2 miles, with sections, was prepared by A. R. Crandall and J. B. Hoeing, and was published by the Kentucky Geological Survey, Series II, in 1886. The map is very inaccurate and incomplete. It is exhausted in edition.

The topography of a small portion of eastern Elliott County is shown on the Kenova quadrangle, scale 1:125,000.

ESTILL COUNTY

No unit map for this county has been prepared by the Kentucky Geological Survey, but the topography for all of Estill County is available on the Richmond and Beattyville sheets, both to the scale of 1:125,000.

A small part of Estill County was mapped geographically by C. Schenk for the Kentucky Geological Survey in 1875-76, Series II. Title of this map was "Plan of a Part of Powell, Wolfe, Morgan and Estill Counties," scale 4 13/16 inches=8 miles. This map is now out of print.

FAYETTE COUNTY

The geology of Fayette County is now being executed by A. M. Miller for the Kentucky Geological Survey, Series VI, and map will be published in the near future, scale 1 inch=1 mile. The topography for Fayette County with exception of the northeastern section is available on the Georgetown quadrangle, scale 1:62,500, and the Harrodsburg and Richmond quadrangles, both to the scale of 1:125,000.

A useful geographic farm map, scale 1 inch=4,884 feet, was prepared and published as a private enterprise by J. P. Mullin and J. M. Corbin, of Lexington, Kentucky, in 1904. A new block farm map of Fayette County has been prepared by P. A. Rowe & Co., No. 304 Fayette National Bank Building, Lexington, Kentucky. This map is on fifteen sheets 24"x44" blue line on leather or cloth. A wall map of Fayette County with dimensions six by eight feet has been reduced from this block map by Rowe & Co., and is available in blue print form. Another excellent map of Fayette County was prepared and privately published by W. C. Eyl in 1923.

FLEMING COUNTY

A geological map of Fleming County coupled with that of Bath was prepared by J. B. Hoeing, scale 1 inch=2 miles, and published in colors by the Kentucky Geological Survey, Series II, in 1886. This map is out of print and very rare.

No topography is available for this county.

FLOYD COUNTY

A structural map showing the oil and gas structural geology of Floyd County, in colors, was prepared in 1922, by James S. Hudnall, for the Kentucky Geological Survey, Series VI. The contour interval is 10 feet. The keybed used is Vanlear (Prestonsburg) coal. This map is available.

A portion of Floyd County was shown on the geographic "Map of Morgan, Johnson, parts of Magoffin, Floyd and Martin" Counties, by A. R. Crandall, which was published by the Kentucky Geological Survey, Series II, without date. This map is out of print.

The topography for all of Floyd County is available on the following quadrangles: Paintsville, Inex, Harold, Pikeville, Hindman and Prestonsburg, scale of each 1:62,500.

The southeastern portion of Floyd County is also shown on a set of four geographic maps published by the Kentucky Geological Survey, Series IV, in its map packet of 1913. These geographic maps are available.

FRANKLIN COUNTY

A geological map of Franklin County was prepared by A. M. Miller and L. M. Sellier, and was published in colors by the Kentucky Geological Survey, Series IV., scale 1 inch=2 miles. This map is now exhausted in edition.

A soil map of Franklin County, in colors, scale 1 inch=2 miles, by L. M. Sellier and S. C. Jones, was published by the Kentucky Geological Survey, Series IV. This map is also out of print.

The topography for all of Franklin County, excepting the northeastern corner, is available on the following sheets: Lockport, Frankfort and Georgetown, all to the scale of 1:62500.

FULTON COUNTY

This county has never been separately mapped, but is included in the large colored geological map of the Jackson Purchase region, scale 1 inch=2 miles, by R. H. Loughridge, J. B. Hoeing, and H. R. Ayers, which was issued by the Kentucky Geological Survey, Series II, in 1885; and is still available.

Calloway County is also shown on the soil map of the Jackson Purchase region, scale 1:300000, by R. H. Loughridge and J. B. Hoeing, issued in colors by the Kentucky Geological Survey, Series II, in 1886. This map may still be secured, but the topography of Calloway County has never been executed.

GALLATIN COUNTY.

A geographic, reconnaissance map of Gallatin County, coupled with Carroll County, scale 1 inch=1 mile, was prepared by J. L. Bissell for the Kentucky Geological Survey, Series VI, in 1923. This map is now available. The topography has never been executed for this region.

GARRARD COUNTY

A geological map of Garrard County, scale 1 inch=2 miles, was prepared by J. B. Hoeing and W. H. Linney, and issued in colors by the Kentucky Geological Survey, Series II, about 1882. This map is out of print and is rare.

The topography for this entire county is available on the Harrodsburg, Richmond and London quadrangles, all to the scale of 1:125000.

GRANT COUNTY

A geographic reconnaissance map of Grant County is now in preparation by J. L. Bissell for the Kentucky Geological Survey, Series VI. This is the first map to be prepared for Grant County. The topography for this region has never been exhausted.

GRAVES COUNTY

A soil map of Graves County, scale 1 inch=1 mile, was prepared by the U. S. Department of Agriculture, and the Kentucky Agricultural Experiment Station co-operating, by (?) in (?)

A reduced soil map showing Graves County is available for the Jackson Purchase region. This map was prepared to the scale of

1:300000, by R. H. Loughridge and J. B. Hoeing, and was issued by the Kentucky Geological Survey in 1886. The topography of Graves County has never been executed.

GRAYSON COUNTY

No unit map of Grayson County has ever been published by the Kentucky Geological Survey. A map in two parts, however, number 1 and 2, under the title "Map of Hancock and parts of Ohio, Grayson and Breckinridge Counties, Showing the Eastern Outline of the Western Coal Field," was prepared by P. N. Moore and W. B. Page assisted by Underwood and Cole, scale 1:60000, and was published by the Kentucky Geological Survey, Series II, in 1878. This map shows the northern portion of Grayson County, and is out of print.

The topography for the southern portion of Grayson County is available on the Leitchfield Cub Run, and Horse Branch quadrangles, all to the scale of 1:62500.

A sketch map of Grayson County was prepared some years ago through the private enterprise of Mr. John Stone, of Leitchfield, Kentucky, and is available from him in blue print form.

A sketch map showing the Nolin River basin, by L. M. Sellier, which accompanied volume II, Series IV, shows some of the geologic and economic aspects of southern Grayson County.

GREEN COUNTY

A geological map of Green County coupled with that of Taylor and Adair Counties was prepared, scale 1 inch=2 miles, by A. M. Miller and J. W. Norwood, and published by the Kentucky Geological Survey, in colors, Series III, without date. This map is out of print.

A soil map of Green County, scale 1 inch=2 miles, in colors, was prepared by S. C. Jones and J. W. Norwood, and was published by the Kentucky Geological Survey, Series 3, without date. This map is still available.

The topography of Green County has never been executed.

GREENUP COUNTY

A map exhibiting the topographical and geological features of a part of Greenup County together with portions of Carter and Lawrence Counties, scale 1 inch=1 mile, was prepared by S. S. Lyon, E. Mylotte, P. O. Bierne, in 1857, and was issued by the Kentucky Geological Survey, Series I.

In 1876 a topographic map, scale 1 inch=2 miles, of Greenup and Boyd Counties, including part of Lawrence County, was prepared by C. Schenk and W. Mitchell, and published by the Kentucky Geological Survey, Series II.

A map of Boyd, Carter and Greenup Counties, in colors, was prepared by J. B. Hoeing and A. R. Crandall, and was published about 1884 by the Kentucky Geological Survey, Series II. All of these maps are now out of print and are very rare.

The topography of southern Greenup County is available on the Kenova Sheet, scale 1:125000, but the northern and western parts of the county have never been topographically surveyed.

HANCOCK COUNTY

In 1878 the Kentucky Geological Survey, Series II, produced a map in two parts (I and II) entitled "Hancock County and Parts of Ohio, Grayson and Breckinridge Counties showing the eastern outline of the Western Coal Field," scale 1:60000, black and white, by P. N. Moore and W. B. Page, aided by Hoeing, Underwood and Cole. This is the only geographical map that has ever been produced of Hancock County, but the topography for the western portion of Hancock County is available on the Tell City sheet, scale 1:62500. The geology of the Tell City sheet has been written and published by the Kentucky Geological Survey, Series IV, Vol. 1, Part 1; but no map accompanied this report.

HARDIN COUNTY

The Kentucky Geological Survey has never mapped Hardin County, and no map is available for this county. The topographic field work for the Ekron and Vine Grove sheets, scale 1:62500, has been partially completed. These quadrangles include the northern portion of Hardin County, but they are not available for distribution at the present time.

A small portion along the Upper Nolin River has been topographically surveyed on the Cub Run sheet, scale 1:62500.

HARLAN COUNTY

No unit map of Harlan County has been produced by the Kentucky Geological Survey, but the topography for the entire county is available on the Harlan, Nolansburg, Cornettsville and Whitesburg quadrangles, all to the scale of 1:62500 and on the Estillville and Cumberland Gap quadrangle, both to the scale of 1:125000.

The geology of the southwestern portion of Harlan County south of Pine Mountain has been executed by George H. Ashley and L. C. Glenn in U. S. G. S., P. P. No. 49, and the easternmost portion of Harlan County has been mapped geologically by M. R. Campbell on the U. S. G. S., Estillville folio, No. 12. This sheet covers an area of 957 square miles.

Harlan County in its entirety with some adjoining counites, is also shown on a map of the Cumberland Mountain System, scale 1 inch=4 miles, by J. B. Hoeing (topography in brown stipple and black base). This map was published by the Kentucky Geological Survey, Series II, in 1891.

A part of Harlan County is shown on a map of the Upper Cumberland Valley and contiguous regions, scale 1 inch=1½ miles, Black and white, by J. B. Hoeing. This map was published by the Kentucky Geological Survey, Series III, in 1907. It is exhausted in edition. And the map entitled "A Map of the Cumberland River and Adjacent Territory," scale 1 inch=1 mile, black and white, by L. M. Sellier, shows the northeastern part of Harlan County. It was published by the Kentucky Geological Survey, Series IV, in 1916, and is now out of print.

HARRISON COUNTY

A reconnaissance geographic map of Harrison County, scale 1 inch=1 mile, was prepared by J. L. Bissell, and published by the Kentucky Geological Survey, Series VI, 1923.

No topography has been executed for Harrison County.

HART COUNTY

A reconnaissance geographic map, scale 1 inch=2 miles, was prepared by J. L. Bissell and published by the Kentucky Geological Survey, Series VI, in black and white during 1923.

The topography of the western portion of Hart County is shown on the new Cub Run quadrangle, scale 1:62500.

HENDERSON COUNTY

No unit map of Henderson County has been published by the Kentucky Geological Survey, but the topography for the entire county is available on the Uniontown, Morganfield, Henderson, Sebree, Newburg and Calhoun quadrangle, all scale 1:62500.

The geology of the Newburg and Calhoun quadrangle has been executed, and maps for these sheets were published in Bulletin No. 19, Kentucky Geological Survey, Series III, in 1912. Though in a small number, these maps are still available.

HENRY COUNTY

A geological map of Henry County together with Shelby and Oldham, in colors, scale 1 inch=2 miles, was prepared by J. B. Hoeing and W. M. Linney, and published by the Kentucky Geological Survey, Series II, about 1887. This map is still available.

The topography for the southeastern portion of Henry County is available on the Lockport sheet, scale 1:62500, and the topographic field work for the southwestern portion of Henry County has been completed on the Lagrange quadrangle, scale 1:62500, which is not yet available for the Henry County section.

HICKMAN COUNTY

This county has never been separately mapped, but is included in the large geological map of the Jackson Purchase region, scale

1 inch=2 miles, by R. H. Loughridge, J. B. Hoeing, and H. R. Ayers, which was issued by the Kentucky Geological Survey, Series III, in 1885; and is still available.

Hickman County is also shown on the soil map of the Jackson Purchase region, scale 1:300000, by R. H. Loughridge and J. B. Hoeing, issued by the Kentucky Geological Survey, Series II, in 1886. This map is still available. The topography has never been executed.

HOPKINS COUNTY

A geographic map entitled "Map No. 2 of Hopkins County," was prepared by Sidney S. Lyon for the Kentucky Geological Survey, Series I, in 1857.

The topography for all of Hopkins County is available in the following sheets, all to the scale of 1:62500: Providence, Earlington, Madisonville, Calhoun, Nortonville, Dawson Springs and Princeton sheets.

The geology of Hopkins County has been prepared on the several topographic sheets covering it, and published as follows by the Kentucky Geological Survey, Series III, in Bulletin No. 19, geology of the Madisonville and Calhoun quadrangles, Series IV, Volume II, Part I, geology of the Earlington and Dawson Springs quadrangles. Series IV, Vol. 3, Part I, has the Nortonville quadrangle.

In 1923 the Kentucky Geological Survey, Series VI, published a composite geologic map, black and white, scale 1 inch=1 mile, showing the geology for Hopkins County as prepared above.

JACKSON COUNTY

A sketch map showing the geology of the greater part of Jackson County (in colors), scale 1 inch=2 miles, together with a portion of Rockcastle County was prepared by G. M. Sullivan, and published by the Kentucky Geological Survey, Series II, in 1891. This map is out of print.

The topography of Jackson County has been executed and is available on the London, Richmond, Beattyville and Manchester quadrangles, all to the scale of 1:125,000.

The geology of Jackson County is also shown on quadrangular maps, scale 1:125,000, showing the western border of the eastern coal field, prepared by A. M. Miller and published by the Kentucky Geological Survey, Series III, in 1910, and accompanying Bulletin No. 12.

JEFFERSON COUNTY

A geological map of Jefferson County, scale 1 inch=1 mile, was prepared by Charles Butts for the Kentucky Geological Survey (Series IV), and the U. S. Geological Survey in co-operation in 1915. This may is exhausted in edition.

The topography for all of Jefferson County is available on the Kosmosdale, Louisville and Prospect sheets, scale 1:62,500.

JESSAMINE COUNTY

A soil map of Jessamine County, in colors, scale 1 inch=1 mile, was prepared by Risden T. Allen, and was issued by the U. S. Department of Agriculture in 1915. This map is available.

The geology of Jessamine County is now being executed by A. M. Miller, and will be published by the Kentucky Geological Survey, Series VI, in black and white, scale 1 inch=1 mile.

The topography for all of Jessamine County is available on the Harrodsburg and Richmond quadrangle, scale 1:125,000, and the Georgetown quadrangle, scale 1,62,500.

JOHNSON COUNTY

The oil and gas structural geology of Johnson County, scale 1 inch=1 mile, with 10 feet contours based on the fire clay coal, was prepared by I. B. Browning, for the Kentucky Geological Survey, Series VI. This map was published in 1921 and is now available.

The topography of Johnson County is available on the Paintsville, Inez and Prestonsburg sheets, scale 1:62,500.

KENTON COUNTY

A geographical reconnaissance map of Kenton County, scale 1 inch=1 mile, was prepared by J. L. Bissell, and published by the Kentucky Geological Survey, Series VI, in 1923. This map is available.

The topography for the northern part of Kenton County is available on the Cincinnati double quadrangle, scale 1:62,500.

KNOTT COUNTY

A geological map of Knott County showing oil and gas structure, scale 1 inch=1 mile, with 10 foot contours, placed on the fire clay coal, was prepared by I. B. Browning for the Department of Geology and Forestry of Kentucky, and published in colors in 1919. This map is now available.

The topography of Knott County is available on the Troublesome, Hindman, Prestonsburg, Whitesburg and Cornettsville sheets, scale 1:62,500, and on the Salyersville sheet, scale 1:125,000.

KNOX COUNTY

No unit map of Knox County has ever been prepared or published by the Kentucky Geological Survey, but the topography for all of Knox County is available on the Manchester, Williamsburg and Cumberland Gap sheets, all to the scale of 1:125,000.

LARUE COUNTY

No map has been prepared of Larue County by the Kentucky Geological Survey, but a map of this county, in colors, without scale, was published as a private enterprise in 1899, by Charles Williams and C. M. Barnes, of Hodgenville, Kentucky. It may still be secured from Mr. Williams. This map is not an accruate one, but is the only one available for the region.

The topography of Larue County has never been surveyed.

LAUREL COUNTY

No unit map of Laurel County has ever been prepared by the Kentucky Geological Survey. The geology of the western portion of this county has been executed in part on the London U. S. Geological Survey Folio No. 47, by M. R. Campbell, in 1898. The area of this sheet is 950 square miles.

The southern part of Laurel County has been mapped geologically by A. M. Miller for the Kentucky Geological Survey, Series III. Maps showing this region accompany report, Bulletin No. 12, "The Coals of the Western Border of the Eastern Coal Field." This report is exhausted in edition.

The topography for all of Laurel County is available on the London, Manchester, Cumberland Gap and Williamsburg quadrangles, each to the scale of 1:125,000.

LAWRENCE COUNTY

A map of the oil and gas structural geology for Lawrence County is being prepared by James S. Hudnall for the Kentucky Geological Survey, Series VI. The map shows the structural geology contoured on the fire clay coal with intervals of 10 feet. This map will soon be available.

The topography for Lawrence County with exception of the very southwestern tip adjoining Morgan County is shown on the Kenova quadrangle, scale 1:125,000.

LEE COUNTY

No unit map of Lee County has ever been prepared or published by the Kentucky Geological Survey, but the topography for the entire county is available on the Beattyville, Salyersville and Manchester sheets, all to the scale of 1:125,000.

LESLIE COUNTY

A map showing the oil and gas structural geology of Leslie County was prepared by C. V. Theis and George W. Morris, for the Kentucky Geological Survey, Series VI, in 1923. The contour interval is 10 feet and the keybed is fire clay coal. The map is available.

The topography for all of Leslie County is available on the following sheets, all to the scale of 1:62,500: Buckhorn, Hyden, Cornettsville and Harlan; and on the Manchester and Cumberland Gap sheets, each to the scale of 1:125,000.

LETCHER COUNTY

A map showing the structural geology and the coal mines of Letcher County was prepared by A. F. Crider, and published by the Kentucky Geological Survey, Series IV. The contour interval is 25 feet based on the fire clay coal. The scale of the map is 1 inch=1 mile.

The topography for all of Letcher County is available on the Pikeville, Pound, Whitesburg, Nolansburg and Cornettsville sheets, each to the scale of 1:125,000.

LEWIS COUNTY

No map of Lewis County has ever been prepared by the Kentucky Geological Survey, and no topographic maps covering this area are available.

LINCOLN COUNTY

A geological map of Lincoln County, scale 1 inch=2 miles, was prepared by J. B. Hoeing and W. M. Linney, and was published in colors by the Kentucky Geological Survey, Series II. This map is exhausted in edition.

The topography for the northern and eastern part of Lincoln County is shown on the Harrodsburg and London quadrangles, each to the scale of 1:125,000.

LIVINGSTON COUNTY

A geological reconnaissance map of Livingston County (with Lyon), 1 inch=2 miles, was prepared by J. L. Bissell, and published by the Kentucky Geological Survey in Series VI, in 1923.

The northern part of Livingston County has been topographically surveyed and is available on the Golconda and Cave-in-Rock quadrangles, scale 1:62,500.

LOGAN COUNTY

A soil map of Logan County, in colors, scale 1 inch=1 mile, was prepared by Groves B. Jones, L. R. Schoenmann, and S. D. Averitt, and published by the U. S. Department of Agriculture in 1919. This map is available.

The topography for the northern part of Logan County has been executed, and is available on the Drakesboro, Dunmor and Little Muddy sheets, each to the scale of 1:62,500.

LYON COUNTY

A reconnaissance geographical map of Lyon County (with Livingston), scale 1 inch=2 miles, in black and white, was prepared by J. L. Bissell and published by the Kentucky Geological Survey in 1923, Series VI.

Only a small portion of Lyon County adjoining Caldwell County is topographically surveyed on the Princeton sheet, scale 1:62,500.

McCRACKEN COUNTY

This county is not mapped as a unit geologically, but is included in the large geological map of the Jackson Purchase region, scale 1 inch=2 miles, by R. H. Loughridge, J. B. Hoeing and H. R. Ayers, which was issued by the Kentucky Geological Survey, Series II, in 1885, and is still available.

McCracken County is also shown on the soil map of the Jackson Purchase region, scale 1:300,000, by R. H. Loughridge and J. B. Hoeing, issued by the Kentucky Geological Survey, in 1886. The topography of McCracken County has never been executed.

A soil map of McCracken County was prepared, scale 1 inch square 1 mile in 1905, by Thomas D. Rice and published with a bulletin by U. S. Dept. of Agriculture in 1906.

McCREARY COUNTY

No unit map for McCreary County has ever been produced, but the geology of the eastern portion of McCreary County is shown on an old map of Whitley County which was produced in 1889 by J. B. Hoeing and A. R. Crandall, and published by the Kentucky Geological Survey, Series II. This map shows parts of what was then Pulaski, Bell and Wayne Counties.

The topography for the eastern part of McCreary County is available on the Williamsburg sheet, scale 1:62,500.

McLEAN COUNTY

No unit map of McLean County has ever been prepared or published by the Kentucky Geological Survey, but the topography for the entire county is available on the following sheets, each prepared to the scale of 1:62,500: Calhoun, Sutherland, Central City and Madisonville. The geology of the Calhoun, Madisonville and Central City sheets has been executed, and is found in Bulletin 19, Series III of the Kentucky Geological Survey.

The geology of the Sutherland quadrangle has never been mapped.

MADISON COUNTY

A geological map of Madison County, scale 1 inch=2 miles, in colors, was prepared by John R. Procter and J. B. Hoeing, and was published by the Kentucky Geological Survey, Series II. This map is not dated.

Madison County has also been covered by the U. S. Geological Survey, Richmond Folio No. 46, by M. R. Campbell. The area of this sheet is 944 square miles.

The topography for all of Madison County is available on the Richmond sheet, scale 1:125000.

Madison County soils have been mapped; scale. 1 inch=1 mile, by A. M. Griffen nd Orla L. Ayrs. This county map was published in colors by the U. S. Dept. of Agriculture in 1906.

MAGOFFIN COUNTY

A map of the structural oil and gas geology of Magoffin County, scale 1 inch=1 mile, was prepared by I. B. Browning in 1921 for the Kentucky Geological Survey, Series VI. Contours with 10 feet intervals are shown on the fire clay coal as a keybed.

A geographic map of Magoffin County, in blue and white, scale 1 inch=1 mile, was prepared by L. M. Sellier in 1917. This map shows a few drilled wells for oil and gas, and was published in 1919 by the Kentucky Geological Survey, Series IV, to accompany the report on Magoffin County, by I. B. Browning and Philip Russell.

A map of the structural geology of Magoffin County, in colors, scale 1 inch=2 miles, was prepared by L. M. Sellier, in 1917. Contours with 20 foot intervals were placed on the fire clay coal. A few wells drilled for oil and gas are shown on this map. This map was prepared to accompany the report, indicated above, by Browning and Russell on the Geology and Coals of Magoffin County. Both report and map are exhausted in edition.

A geographic map without date was prepared by A. R. Crandall showing Magoffin and Johnson Counties (no scale) including parts of Magoffin, Floyd and Martin Counties. This map was published by the Kentucky Geological Survey, Series II. It is exhausted in edition, but may be seen in the archives of the State Museum at Lexington, Ky.

The topography of Magoffin County is available on the Paintsville, Prestonsburg and Hindman sheets, all scale 1:62500; and on the Salyersville sheet, scale 1:125000.

MARION COUNTY

A geological map of Marion County published as a unit with Washington County, in colors, scale 1 inch=2 miles, was prepared by J. B. Hoeing, W. M. Linney and W. T. Knott about 1882, and was issued by the Kentucky Geological Survey, Series II. The topography for Marion County has never been surveyed.

MARSHALL COUNTY

This county has never been separately mapped, but is included in the large geological map of the Jackson Purchase region, scale 1 inch=2 miles, by R. H. Loughridge, J. B. Hoeing and H. R. Ayers, which was issued by the Kentucky Geological Survey, Series II, in 1885, and is still available.

Marshall County is also shown on the soil map of the Jackson Purchase region, scale 1:300000, by R. H. Loughridge and J. B. Hoeing, issued by the Kentucky Geological Survey, Series II, in 1886. The topography of Marshall County has never been surveyed.

MARTIN COUNTY

The structural geology of Martin County, black and white, scale 1 inch=1 mile, was executed by James S. Hudnall, and published by the Kentucky Geological Survey, Series VI, in 1923.

An old map without date, entitled "Martin, Johnson, and parts of Floyd, Magoffin and Martin" (no scale), was prepared by A. R. Crandall, and published by the Kentucky Geological Survey, Series II. It is exhausted in edition.

The topography for all of Martin County is available on the Naugatuck, Inez, Harold and Williamson quadrangles, scale 1:62500.

MASON COUNTY

A geological map of Mason County, in colors, scale 1 inch=2 miles, was prepared by J. B. Hoeing about 1885, and published by the Kentucky Geological Survey, Series II. This map is exhausted in edition.

A soil map of Mason County, in colors, scale 1 inch=1 mile, was prepared by R. T. Avon Burke, and was published with a bulletin by the U. S. Dept. of Agr. in 1904.

The topography of Mason County has never been executed.

MEADE COUNTY

A geological map of Meade County, in colors, scale 1 inch=2 miles, was prepared as a unit with Breckinridge County, by J. B. Hoeing and R. H. Loughridge, in 1891, and was published by the Kentucky Geological Survey, Series II. In the same year a geographic map of Meade County showing gas wells, in colors, scale 1 inch=2 miles, was prepared by R. H. Loughridge and published by the Kentucky Geological Survey, Series II. This map is still available.

The topography for all of Meade County has never been executed though the field work for the Ekron and Vine Grove sheets which comprise eastern Meade County has been partially completed. No quadrangles touching on Meade County have been published.

MENIFEE COUNTY

No unit map of Menifee County has been prepared by the Kentucky Geological Survey, but a geographic map of a part of Menifee showing portions of Bath, Montgomery, Powell, Wolfe, Morgan and Estill Counties, scale 4 13/16 inches=8 miles, was prepared by C. Schenk in 1875-76, and published by the Kentucky Geological Survey, Series II. This map is exhausted in edition.

The topography for the southern portion of Menifee County is available on the Beattyville and Salyersville quadrangles, scale 1:125,000.

MERCER COUNTY

A geological map of Mercer County prepared as a unit with Boyle County, in colors, scale 1 inch=2 miles, by J. B. Hoeing, J. C. Fales and W. M. Linney, was published by the Kentucky Geological Survey, Series II. This map is out of print and rare.

The topography for all of Mercer County with exception of a very narrow area adjoining Washington County line is available on the Harrodsburg quadrangle, scale 1:125000.

METCALFE COUNTY

A geological map of Metcalfe County, black and white, scale 1 inch=1 mile, showing oil and gas wells was prepared by H. D. Crider in 1923, and published by the Kentucky Geological Survey, Series VI.

The detailed topography of Metcalfe County has never been surveyed.

MONROE COUNTY

A geographical map of Monroe County, black and white, scale 1 inch=1 mile, showing oil and gas wells was prepared by George W. Pirtle, in 1923, and published by the Kentucky Geological Survey, Series VI.

The detailed topography of Monroe County has never been surveyed.

MONTGOMERY COUNTY

A geological map of Montgomery County was prepared as a unit with Clark County, in colors, scale 1 inch=2 miles, by J. B. Hoeing, J. C. Fales and W. M. Linney, and published by the Kentucky Geological Survey, Series II, without date.

The topography for the southern portion of Montgomery County is available on the Beattyville quadrangle, scale 1:125,000.

MORGAN COUNTY

A geographical map of Morgan and Johnson Counties showing parts of Magoffin, Floyd and Martin Counties, without scale or date, was prepared by A. R. Crandall, and published by the Kentucky Geological Survey, Series II. The map is rare and may be seen in the archives of the State Museum at Lexington, Kentucky.

The topography of Morgan County is available with exception of a small, northern portion on the Salyersville and Beattyville sheets, scale 1:125,000; and the Paintsville sheet, scale 1:62,500.

MUHLENBERG COUNTY

No unit map of Muhlenberg County has ever been published by the Kentucky Geological Survey, but the geology for the entire county is available on the Nortonville, Drakesboro and Dunmor quadrangles which were prepared by A. F. Crider, and published by the Kentucky

Geological Survey, Series IV, in 1915, with Volume 3, Part 1, as quadrangular units.

The geology on the Madisonville and Central City quadrangles shows the northern portion of Muhlenberg County was prepared by F. M. Hutchinson, and published by the Kentucky Geological Survey, Series III, with Bulletin No. 19. A small portion of Muhlenberg County south of Rockport and west of the Green River is included in the geology of the Hartford quadrangle, by James H. Gardner, which was published by the Kentucky Geological Survey, Series III, in 1912, in Bulletin No. 20. No standard scale map including the Hartford quadrangle was published, but sectional maps are included in the Hartford report.

A soil map of Muhlenberg County in colors has been prepared and will be published with a bulletin by the U. S. Dept. of Agriculture in the near future.

NELSON COUNTY

A geological map of Nelson County was prepared as a unit with Spencer, in colors, scale 1 inch=2 miles, by J. B. Hoeing and W. M. Linney about 1886, and published by the Kentucky Geological Survey, Series II.

The topography for Nelson County has never been surveyed.

NICHOLAS COUNTY

No map for Nicholas County has ever been prepared by the Kentucky Geological Survey, and the topography for this region has never been surveyed.

OHIO COUNTY

In 1878 two black and white maps, scale 1:60000, were prepared showing Hancock and parts of Ohio, Grayson and Breckinridge Counties with outline of the western coal field, by Moore, Page, Hoeing and Underwood. These maps were published by the Kentucky Geological Survey, Series II. This series of maps shows only the northeastern portion of Ohio County. No unit map of Ohio County is available, nor has one ever been prepared, but the topography of Ohio County with the exception of the northeastern section is available on the Sutherland, Whitesville, Central City, Hartford, Dunmor and Horse Branch quadrangles, scale 1:62500.

OLDHAM COUNTY

A geological map of Oldham County including Henry and Shelby Counties, in colors, scale 1 inch=2 miles, was prepared by J. B. Hoeing and W. M. Linney about 1887, and published by the Kentucky Geological Survey, Series II. This map is still available. The topography for the western portion of Oldham County adjoining Jefferson and Ohio River is available on the Prospect sheet, scale 1:62500.

OWEN COUNTY

A geological reconnaissance map of Owen County, black and white, scale 1 inch=1 mile, was prepared by F. W. Bertsch in 1923, showing the location of the oil and gas wells, and published by the Kentucky Geological Survey, Series VI.

The topography for the southwestern portion of Owen County adjoining the Kentucky River is available on the Lockport quadrangle, scale 1:62500.

OWSLEY COUNTY

No unit map of Owsley County has been prepared by the Kentucky Geological Survey, but the geology for the northern and western portions of Owsley County has been executed by A. M. Miller on regional maps, scale 1 inch=2 miles, in colors, and published by the Kentucky Geological Survey, Series III, in Bulletin No. 12 on "The Coals of the Western Border of the Eastern Coal Field." The topography of Owsley County is shown on the Beattyville and Manchester sheets, scale 1:125000.

PENDLETON COUNTY

A reconnaissance geographical map of Pendleton County, black and white, scale 1 inch=2 miles, was prepared by J. L. Bissell in 1923, and published by the Kentucky Geological Survey, Series VI.

The topography of Pendleton County has never been surveyed.

PERRY COUNTY

An oil and gas structural map of Perry County, black and white, scale 1 inch=1 mile, was prepared by J. S. Hudnall, assisted by C. V. Theis and Geo. W. Morris, in 1923. This map shows 10 feet contours on the fire clay coal as a keybed. It was published by the Kentucky Geological Survey, Series VI.

The topography of Perry County is available on the following sheets: Buckhorn, Troublesome, Hyden, Cornettsville, Whitesburg and Nolansburg, all scale 1:125000.

PIKE COUNTY

A geographic map in four parts showing Pike County, scale 1 inch=1 mile, was prepared by L. M. Sellier, in 1913, and published by the Kentucky Geological Survey, Series IV, in a red cloth bound library packet.

In 1922 James S. Hudnall prepared a structural oil and gas map of Pike County, scale 1 inch=1 mile, with 10 feet contours placed on the Vanlear (Prestonsburg-Upper Marrowbone) coal as keybed. This map was published by the Kentucky Geological Survey, Series VI, in 1923.

The topography of Pike County is available on the following sheets: Harold, Williamson, Mattewan, Gilbert, Hurley, Regina, Pikeville, Pound and Clintwood, all to the scale 1:62,500.

POWELL COUNTY

The principal part of Powell County is shown on a map prepared in 1875-76 by C. Schenk, entitled "Plan of a Part of Bath, Menifee, Mongtomery, Wolfe, Powell, Morgan and Estill Counties," scale 4 13/16 inches=8 miles.

The geology of Powell County has been executed by A. M. Miller and published with Bulletin No. 12 of the Kentucky Geological Survey, Series III, entitled "The Coals of the Western Border of the Eastern Coal Field."

The topography of Powell County is available on the Richmond and Beattyville quadrangles, scale 1:125,000.

PULASKI COUNTY

No unit map of Pulaski County has ever been prepared. The eastern portion of Pulaski County, however, has been geologically surveyed on the U. S. G. S. London folio by M. R. Campbell. No maps of any kind are available for western Pulaski County, the topography having never been surveyed for this region.

ROBERTSON COUNTY

No unit map is available showing Robertson County, and none has been published by the Kentucky Geological Survey. The topography for this county has never been executed.

ROCKCASTLE COUNTY

A geological map of Rockcastle County coupled with one for Jackson County, in colors, scale 1 inch=2 miles, was prepared by Geo. M. Sullivan, and was published by the Kentucky Geological Survey in 1891, Series II.

A soil map of Rockcastle County, scale 1 inch=1 mile, in colors, was prepared by R. T. Avon Burke and Clarence Lorensburg, contour interval 100 feet, and published by the Department of Agriculture in 1910.

The topography of Rockcastle County is available on the London and Richmond quadrangles, scale 1:125,000.

ROWAN COUNTY

No map for Rowan County has ever been prepared or published by the Kentucky Geological Survey. The topography for this region has never been surveyed.

RUSSELL COUNTY

No map of Russell County has ever been prepared or published by the Kentucky Geological Survey. The topography for Rowan County has not been surveyed. An oil and gas sketch map, scale 1.2 inches=1 mile, produced as a private enterprise, is available, however, by S. Yunker, 311 W. Chestnut Street, Louisville, Ky., in blue print form.

SCOTT COUNTY

A soil map of Scott County was prepared in 1903, scale 1 inch=1 mile, by R. T. Avon Burke. This map was published, in color, by the U. S. Department of Agriculture. This map is out of print.

A geographic map for the entire county, scale 1 inch=1 mile, black and white, was prepared by J. L. Bissell, and published by the Kentucky Geological Survey, Series VI, in 1923.

The geology of the Georgetown sheet was executed by A. M. Miller, and issued by the Kentucky Geological Survey, Series IV, in colors, in 1913. This map is available.

The topography of the Georgetown quadrangle has been surveyed and is available, scale 1:62,500.

SHELBY COUNTY.

A map showing the geology of Shelby County, coupled with that of Henry and Oldham, was prepared by J. B. Hoeing and W. M. Linney, and published in colors, scale 1 inch=2 miles, by the Kentucky Geological Survey, Series II. This map is still available.

A soil map of Shelby County, scale 1 inch=1 mile, in colors, was prepared by Clarence Van Duyne, L. R. Schoenmann, and S. D. Averitt in 1916, and published by the U. S. Department of Agriculture.

A small area bordering the Jeptha Knobs in Shelby County near Clay Village has been topographically surveyed, and this map is now available. The topography for the Shelbyville sheet is now being executed.

SIMPSON COUNTY

No unit map of Simpson County has been prepared by the Kentucky Geological Survey. An oil and gas sketch map showing farms has been prepared, however, as a private enterprise, scale 2 inches=1 mile, by V. S. Hammond and G. L. Jackson of Franklin, Kentucky. This map is available in blue print form.

The northeastern portion of Simpson County has been topographically surveyed on the Bowling Green sheet, scale 1:62500. This map is available.

SPENCER COUNTY

A geological map of Spencer County, in colors, scale 1 inch=2 miles, was prepared by J. B. Hoeing and W. N. Linney in 1884, and was published by the Kentucky Geological Survey, Series II. The topography of the northern part of Spencer County is shown on the Louisville and Taylorsville sheets, each scale 1:62500. The Taylorsville sheet is only partially completed.

TAYLOR COUNTY

A geological map of Taylor County coupled with Green and Adair, in colors, scale 1 inch=2 miles, was prepared by A. M. Miller and J. W. Norwood, and published by the Kentucky Geological Survey, Series III, date not given.

A soil map of Taylor County coupled with Green and Adair Counties, in colors, scale 1 inch=2 miles, was prepared by J. C. Jones and J. W. Norwood, and was published by the Kentucky Geological Survey, Series III, without date.

The topography of Taylor County has never been surveyed.

TODD COUNTY

No unit map of Todd County has ever been prepared or published by the Kentucky Geological Survey, but one prepared by private enterprise is available at Elkton. The region is not surveyed topographically except the northernmost part which is shown on the Drakesboro quadrangle, scale 1:62500.

TRIGG COUNTY

A geological map of Trigg County coupled with Christian County, black and white, scale 1 inch=2 miles, was prepared by F. J. Fohs and J. B. Hoeing, and published by the Kentucky Geological Survey, Series III, without date.

Trigg County is not surveyed topographically except the very northeastern tip which is included on the Dawson Spring quadrangle, scale 1:62500.

TRIMBLE COUNTY

No unit map of Trimble County has ever been prepared or published by the Kentucky Geological Survey, and it is not known that the region has ever been base mapped in any way. The region is not surveyed topographically.

UNION COUNTY

A topographical and geological map of Union and Crittenden Counties, scale 1:2672, was prepared by S. S. Lyon and published by the Kentucky Geological Survey, Series I, in 1885.

In 1902 a soil map of Union County, in colors, scale 1 inch=1 mile, was prepared by Herbert W. Marean and published by the U. S. Department of Agriculture.

A geological map of the westernmost part of Union County has been published on the Shawneetown quadrangle (Kentucky portion), by the Kentucky Geological Survey, Series IV, in co-operation with the U. S. Geological Survey. This geological map was prepared by Wallace Lee in 1916. This map is out of print.

The topography of all of Union County is available on the following topographic sheets: Shawneetown, New Haven, Uniontown and Morganfield; all to the scale 1:62500.

WARREN COUNTY

A geological map of Warren County, in colors, scale 1 inch=2 miles, was prepared by J. E. McAdoo and J. B. Hoeing, and published by the Kentucky Geological Survey, Series II, in 1891. This map is out of print.

In 1904, a soil map of Warren County, in colors, scale 1 inch=1 mile, was prepared by Thomas D. Rice and W. J. Greib, and published by the U. S. Department of Agriculture. This map is out of print.

In 1919, a geographic map of Warren County, scale 1 inch=2 miles, was prepared by W. R. Jillson, and published by the Department of Geology and Forestry, Series V. This map is available.

The topography of northern Warren County and the section immediately south of Bowling Green is available on the Little Muddy, Mammoth Cave, and Bowling Green sheets; all to the scale 1:62500.

No topography is available for southwestern Warren County, as this region has not yet been topographically mapped.

WASHINGTON COUNTY

A geological map of Washington County coupled with Marion County, in color, scale 1 inch=2 miles, was prepared by J. B. Hoeing, W. M. Linney and W. T. Knott, and published by the Kentucky Geological Survey, Series II, about 1882. This map is still available. The topography of Washington County has never been surveyed.

WAYNE OUNTY

A geological map of Wayne County, scale 1 inch=2 miles, was prepared by H. R. Ayers, and published by the Kentucky Geological Survey, Series II. No date is given on this map.

The region surrounding Monticello is topographically surveyed on the Monticello sheet, scale 1:62500.

WEBSTER COUNTY

A soil map of Webster County, in colors, scale 1 inch=2 miles, was prepared by S. C. Jones and J. W. Norwood, with 50 feet contours, and published by the Kentucky Geological Survey, Series III. No date is given. This map is available for distribution.

A geological map of Webster County, scale 1 inch=1 mile, black and white, was prepared by L. C. Glenn and C. V. Theis, in 1923, and published by the Kentucky Geological Survey, Series VI. This map is now available. The region is topographically surveyed on the Morganfield, Sebree, Calhoun, Madisonville, Earlington and Providence; all scale 1:62500.

WHITLEY COUNTY

The geology of Whitley County, prior to its division to form McCreary County at the west, in colors, scale 1 inch=2 miles, was prepared by J. B. Hoeing and A. R. Crandall, in 1889, and shows parts of Pulaski, Laurel and Bell, and was published by the Kentucky Geological Survey, Series II. No unit map of Whitley County as it now exists has ever been published by the Kentucky Geological Survey. The map prepared in 1889 by Hoeing and Crandall has been out of print for many years, and is very rare.

The topography of eastern Whitley County as it is now constituted is found completely surveyed on the Williamsburg and Cumberland Gap sheets, scale 1:125000.

WOLFE COUNTY

A portion of Wolfe County was geographically surveyed between 1875 and 1876, scale 4 13/16 inches=8 miles, by C. Schenk in connection with portions of Bath, Menifee, Montgomery, Powell, Morgan and Estill Counties. This map was published by the Kentucky Geological Survey, Series II. It is out of print and very rare.

The geology of western Wolfe County has been mapped by A. M. Miller, in colors, scale 1 inch=2 miles, and published by the Kentucky Geological Survey, Series III to accompany the report by same author entitled "Coals of the Western Border of the Eastern Coal Field," Bulletin No. 12.

The topography of Wolfe County has been completely surveyed, and is available on the Bell and Salyersville topographic sheets, both scaled 1:125000.

WOODFORD COUNTY

A geological map of Woodford County, scale 1 inch=1 mile, black and white, was prepared by A. M. Miller in 1923, and published by the Kentucky Geological Survey, Series VI. This map is now availbale.

This region is completely surveyed topographically and is available on the Frankfort and Georgetown quadrangles, scale 1:62500; and on the Harrodsburg quadrangle, scale 1:125000.

CHAPTER IX.

AVAILABLE MAPS AND REPORTS OF THE KENTUCKY GEOLOGICAL SURVEYS

JUNE 1, 1923

INSTRUCTIONS FOR ORDERING: Single copies of any and all maps and reports listed hereunder will be mailed to any interested individual, corporation, company, or institution requesting same, providing the exact fee as indicated is forwarded with the request. **Packages will not be sent express collect.** This survey will not bill any applicant for required charges. Avoid delay and confusion by accompanying your letter of request with money order or check in the proper amount.

GEOLOGIC REPORTS

SERIES VI.

(1920—Date.)

"WILLARD R. JILLSON, SURVEY."

	Required Postal Charge
Vol. 1.—Glass Sands of Kentucky: C. H. Richardson, 1920	.20 cents
Vol. 2.—Economic Papers on Kentucky Geology. W. R. Jillson, 1921	Edition exhausted
Vol. 3.—Oil Feld Stratigraphy of Kentucky. W. R. Jillson, 1921	.30 cents
Vol. 4.—Geology of the Golconda Quadrangle. Stuart Weller, 1921	.30 cents
Vol. 5.—Geology and Coals of Webster County. L. C. Glenn, 1921	.30 cents
Vol. 6.—Sixth Geological Survey. W. R. Jillson and others, 1921	.30 cents
Vol. 7.—Mississippian Series in Eastern Kentucky. Chas. Butts, 1922	.30 cents
Vol. 8.—Clay Deposits of Kentucky. H. Ries, 1922	.30 cents
Vol. 9.—Geography of the Jackson Purchase. D. H. Davis, 1923	.30 cents
Vol. 10.—Geology of Princeton Quadrangle. Stuart Weller and others, 1923	.30 cents
Vol. 11.—Building Stones of Kentucky. C. H. Richardson, 1923	.30 cents
Vol. 12.—New Oil Pools of Kentucky. W. R. Jillson, 1923	.30 cents
Vol. 13.—Fluorspar Deposits of Kentucky. L. W. Currier, 1923	.30 cents
Vol. 14.—Surface Waters of Kentucky. W. H. King, 1923. (In Press)	.30 cents
Vol. 15.—Geological Research in Kentucky. W. R. Jillson, 1923	.30 cents
Vol. 16.—Wild Life in Kentucky. W. D. Funkhouser, 1923. (In Press)	.30 cents
Vol. 17.—Mineral Resources of Kentucky. W. R. Jillson, 1923. (In Press)	.30 cents
Vol. 18.—Geography of the Mountains of Kentucky. D. H. Davis, 1923. (In Press)	.30 cents
Vol. 19.—Geography of the Kentucky Knobs. W. G. Burroughs, 1923. (In Press)	.30 cents
Vol. 20.—Coal Industry in Kentucky. W. R. Jillson, 1923. (In Press)	.30 cents

SERIES V.

(1918-20)

DEPARTMENT OF GEOLOGY AND FORESTRY

Bulletin No. 1.—Oil and Gas Resources of Kentucky. W. R. Jillson. 1919	.25 cents
Bulletin No. 4.—Contributions to Kentucky Geology. W. R. Jillson. 1920	.20 cents

SERIES IV.

(1912-13)

"JOSEPH B. HOEING SURVEY."

Vol. 1, Pt. 1.—Oil, Gas, Barite, Fluorspar, Lead, Water Power, Coals of Big Sandy Valley, Geology of Tell City, Owensboro and Georgetown Quadrangles, Trenton Horizons, Chemistry of Trenton Rocks, Phosphate Deposits. 1913. Maps	.30 cents

Vol. 1, Pt. 2.—Fire Clays of Northeast Kentucky, Technology of Kentucky Clays, Coals of Upper Licking River, Coals of North Fork of Kentucky River, Oolitic Limestones of Warren Co., Asphalt Rock, Soil Surveys, Manufacture of Coke, Elevation and Astronomical Stations. 1913. Maps	.30 cents Postal Charge Required with Order
Vol. 3, Pt. 3.—Coals of North Fork of Kentucky River, Perry, Breathitt, and Knott Counties. Reprint. 1918. Maps	.30 cents
Vol. 4, Pt. 1.—Coals of Letcher County. A. F. Crider. 1916. Maps	.30 cents
Vol. 4, Pt. 3.—Coals of Clay County. J. M. Hodge and P. G. Russell, 1918	.30 cents
Vol. 5, Pt. 1.—Coals of the Middle Fork of the Kentucky River in Leslie and Harlan Counties. J. M. Hodge. 1918	.30 cents

SERIES III.

(1904-1912.)

"CHARLES J. NORWOOD SURVEY."

Bulletin No. 2.—Lead and Zinc Bearing Rocks of Central Kentucky. A. M. Miller. 1905	.05 cents
Bulletin No. 3.—Coals, Clays, Mineral Waters, etc., of Ky. Robert Peter. 1905	.05 cents
Bulletin No. 5.—Upper Ordovician Rocks of Kentucky and their Bryozoa. John M. Nickles. 1905	.05 cents
Bulletin No. 6.—Kentucky Clays. James H. Gardner. 1905	.15 cents
Bulletin No. 7.—Silurian, Devonian and Irvine Formation of East Central Kentucky. A. F. Foerste. 1906	.10 cents
Bulletin No. 13.—The Upper Cumberland Coal Field. J. M. Hodge. 1912	.15 cents
Bulletin No. 14.—Coals of the Pineville Gap Region. A. R. Crandall and G. M. Sullivan. 1912	.15 cents
Bulletin No. 16.—The Waverlain Formation of East Central Kentucky. W. C. Morse and A. F. Foerste. 1912	.05 cents
Bulletin No. 17.—Coals of the Tradewater Region. L. C. Glenn. 1912	.10 cents
Bulletin No. 18.—Coals of the Quicksand Region. F. Julius Fohs. 1912	.15 cents
Bulletin No. 19.—Coals of the Central City, Madisonville, Calhoun and Newburg Quadrangle. F. M. Hutchison. 1912	.20 cents
Bulletin No. 20.—Coals of the Hartford Quadrangle. James H. Gardner. 1912	.10 cents
Bulletin No. 21.—Value of Dix River as a Source of Water Power. A. F. Foerste. 1912	.05 cents
Report of Progress for the years 1908 and 1909. C. J. Norwood	.05 cents
Report of Progress for the years 1910 and 1911. C. J. Norwood	.05 cents

SERIES II.

(1873-1892.)

"JOHN R. PROCTOR SURVEY."

(1880-1882.)

Kentucky Fossil Shells. Nettleroth. 1887	.50 cents

"NATHANIEL S. SHALER SURVEY."

(1873-1880.)

Vol. 5, Pt. 8.—Limonite Ores of Trigg, Lyon and Caldwell Counties. W. B. Caldwell, Jr. 1880	.10 cents

SERIES I.

(1854-1860.)

"DAVID DALE OWEN SURVEY."

All publications entirely exhausted in edition.

SERIES II, III, IV, V, VI.

(1854-1921.)

MAPS

(Note—The postal charge for each map, unless otherwise stated, is 10 cents.)

	Postal Charge Required with Order
Geological map of Kentucky, showing Oil and Gas Pools and Pipe Lines, Eastern and Western Coal Fields, etc., by W. R. Jillson and L. M. Sellier. 1923.	.50 cents
Structural Geology of Breathitt County. I. B. Browning. 1919	.30 cents
Structural Geology of Knott County. I. B. Browning, 1919	.30 cents
Structural Geology Johnson County. I. Browning. 1921	.50 cents
Structural Geology Magoffin County. I. Browning. 1921	.50 cents
Structural Geology Floyd County. J. S. Hudnall. 1923	.50 cents
Structural Geology Martin County, by J. S. Hudnall. 1923	.25 cents
Structural Geology of Pike County. J. S. Hudnall. 1923	.25 cents
Structural Geology of Perry County. J. S. Hudnall, 1923	.25 cents
Structural Geology of Boyd County. J. S. Hudnall, 1923	.25 cents
Structural Geology of Letcher County. L. M. Sellier, 1915	.25 cents
Structural Geology of Leslie County. Hudnall, Theis, Morris, 1923	.25 cents
Oil and Gas Map of Cumberland Co., Ky., by G. W. Pirtle, 1923	.25 cents
Oil and Gas Map of Monroe County. G. W. Pirtle. 1923	.25 cents
Map Packet, 1919, contains the following: Oil and Gas Pools and Pipe Lines of Kentucky (small), Geology of Barren County, Geology of Allen County, Oil and Gas Map of Warren County, Structural Geology of Breathitt County, Structural Geology of Knott County, Kentucky-Appalachian Oil and Gas Fields, Geologic Map of Kentucky (small)	.30 cents
Map Packet. 1913, contains the following: Coal Mine Map—Upper Licking Valley, Coal Mine Map—Pond and Blackberry Creeks—Pike County, Economic Industries Map of Boyd, Carter and Greenup Counties, Economic Industries Map of a Portion of Rowan County, Coal Mine Maps, 1, 2, 3 and 4 of the Upper Big Sandy Valley, Geology of the Georgetown Quadrangle	.30 cents
Soil Map of Shelby County. U. S. Dept. of Ag. and Ky. Ag. St. 1916.	
Soil Map of Mason County. U. S. Dept. Ag. 1903.	
Soil Map of Christian County. U. S. Dept. Ag. 1912.	
Soil Map of Union County U. S. Dept. Ag. 1902.	
Soil Map of Rockcastle County. U. S. Dept. Ag. 1910	
Soil Map of Jessamine County. U. S. Dept. Ag. 1915.	
Soil Map of Jackson's Purchase, by J. B. Hoeing and R. H. Loughridge. 1886.	
Soil Map of Green County, by J. W. Norwood and S. C. Jones.	
Soil Map of Taylor County, by J. W. Norwood and S. C. Jones.	
Soil Map of of Adair County, by J. W. Norwood and S. C. Jones.	
Soil Map of Webster County, by J. W. Norwood and S. C. Jones.	
Map Showing Mountain Passes, by J. B. Hoeing. 1889.	
Map of Kentucky, streams and counties (5x11 inches). J. W. Norwood	.05 cents
Preliminary Map of the Pineville and Middlesboro Region, by J. B. Hoeing. 1907	.25 cents
Map of Kentucky Showing Clay Industries. H. Ries. 1922	.05 cents
Geographic Map of Crittenden County, by L. M. Seller. 1915	.15 cents
Geographic Map of Livingston and Lyon Counties, by J. L. Bissell. 1923	.25 cents
Geographic Map of Boone County, by J. L. Bissell. 1923	.25 cents
Geographic Map of Carroll and Gallatin Counties, by J. L. Bissell	.25 cents
Geographic Map of Grant County, by F. W. Bertsch, 1923	.25 cents
Geographic Map of Harrison County, by F. W. Bertsch. 1923	.25 cents
Geographic Map Kenton and Campbell Counties, by J. L. Bissell. 1923	.25 cents
Geographic Map of Pendleton and Bracken Counties, by J. L. Bissell, 1923	.25 cents
Geographic Map of Owen County, by F. W. Bertsch. 1923	.25 cents
Geographic Map of Scott County, by J. L. Bissell. 1923	.25 cents
Geographic Map of Anderson County, by J. L. Bissell, 1923	.25 cents
Geographic Map of Franklin County, by J. L. Bissell. 1923	.25 cents
Geologic Map of Webster County, by L. C. Glenn. 1923	.25 cents

RECONNAISSANCE GEOLOGIC MAPS

Map of Boyle and Mercer Counties, by J. B. Hoeing and W. M. Linney.	
Map of Henry, Shelby and Oldham Counties, by J. B. Hoeing and W. M. Linney.	
Map of Madison County, by J. B. Hoeing and John R. Procter.	
Map of Meade and Breckinridge Counties, by R. H. Loughridge and J. B. Hoeing, 1891.	
Map of Montgomery and Clark Counties, by J. C. Fales and W. M. Linney.	
Map of Washington and Marion Counties, by W. M. Linney and W. T. Knott.	
Map of Meade County Gas Wells, by R. H. Loughridge. 1891.	
Map of Green, Taylor and Adair Counties, by J. W. Norwood and A. M. Miller.	
Map of Trigg and Christian Counties, by J. B. Hoeing and F. J. Fohs.	
Map of Spencer and Nelson Counties, by W. M. Linney.	
Map of the Jackson Purchase, by R. H. Loughridge. 1885	.25 cents

Generalized Geologic Sections (2 plates) showing anticlines in Meade and Breckinridge Counties, by J. B. Hoeing and R. H. Loughridge. 1891.
General Geological Section from Anderson County through Mercer and Garrard to Sub-Conglomerate Coal in Rockcastle (showing Kentucky anticlinal and synclinal) by W. M. Linney. Series II. Procter.
Geographic Map of Livingston and Lyon Counties by J. L. Bissell. 1923...... .15 cents

TOPOGRAPHIC SHEETS

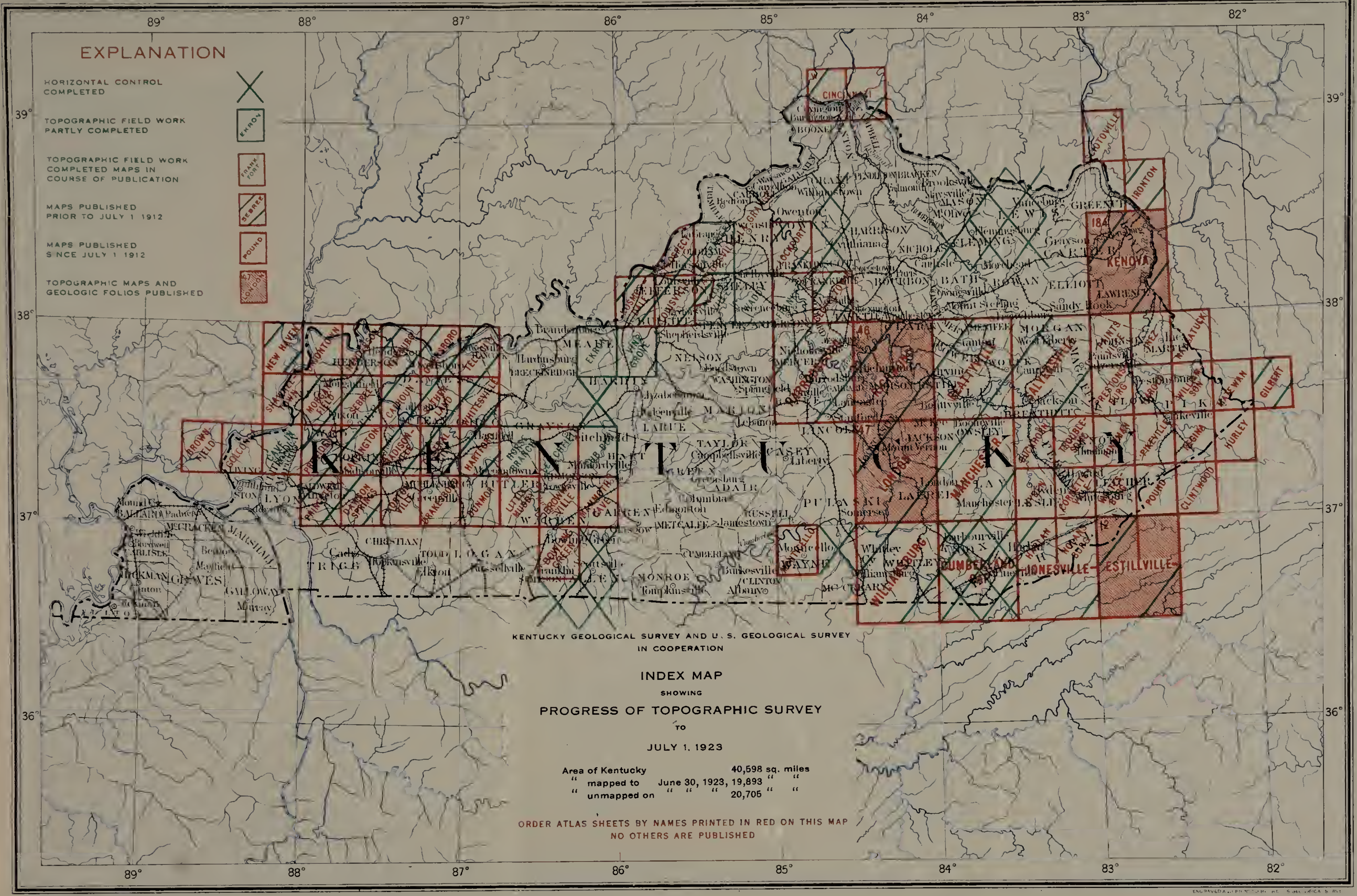
(Note—Order by name, e. g., Georgetown, Richmond, Prestonsburg, etc. The postal charge is 10 cents for each sheet. Send money order or stamps.)

1. Beattyville Quadrangle, parts of Powell, Estill, Montgomery, Menifee, Lee, Wolfe, Breathitt, Clark, Owsley and Jackson Counties.
2. Bowling Green Quadrangle, Warren, Allen and Simpson Counties.
3. Brownsville Quadrangle, Warren, Edmonson and Butler Counties.
4. Buckhorn Quadrangle, parts of Perry and Breathitt Counties.
5. Calhoun Quadrangle, parts of Webster, McLean, Henderson, Davis and Hopkins Counties.
6. Camp Taylor Quadrangle, parts of Jefferson, Bullitt, Spencer, Shelby and Oldham Counties, Kentucky; and Taylor, Posey and Franklin Counties, Indiana.
7. Cave-in-Rock Quadrangle, Crittenden, Caldwell and Livingston Counties.
8. Central City Quadrangle, parts of McLean, Muhlenberg and Ohio Counties.
9. Cincinnati E. & W. Quadrangle, parts of Boone, Kenton and Campbell Counties, Kentucky; and Hamilton and Clermont Counties, Ohio.
10. Cornettsville Quadrangle, parts of Leslie, Perry and Letcher Counties.
11. Cumberland Gap Quadrangle, parts of Laurel, Knox, Clay, Leslie, Harlan, Bell and Whitley Counties, Ky., and Lee, Clairborne and Campbell Counties, Tenn.
12. Dawson Springs Quadrangle, parts of Hopkins, Christian and Caldwell Counties.
13. Drakesboro Quadrangle, parts of Muhlenberg, Todd and Logan Counties.
14. Dunmor Quadrangle, parts of Muhlenberg, Butler, Ohio and Logan Counties.
15. Earlington Quadrangle, parts of Webster and Hopkins Counties.
16. Estillville Quadrangle, small portion of Harlan County, Ky., and Lee, Scott and Wise ounties, Virginia.
17. Frankfort Quadrangle, parts of Franklin, Woodford, Shelby and Anderson Counties.
18. Georgetown Quadrangle, parts of Scott, Fayette, Woodford and Franklin Counties.
19. Golconda Quadrangle, parts of Livingston and Crittenden Counties, Ky., and Pope and Hardin Counties, Illinois.
20. Harlan Quadrangle, parts of Harlan, Leslie and Knox Counties.
21. Harold Quadrangle, parts of Martin, Floyd and Pike Counties.
22. Harrodsburg Quadrangle, parts of Woodford, Jessamine, Boyle, Mercer, Garrard, Lincoln and Anderson Counties.
23. Hartford Quadrangle, parts of Butler, Ohio and Muhlenberg Counties.
24. Henderson Quadrangle, parts of Henderson County.
25. Hindman Quadrangle, parts of Knott and Floyd Counties.
26. Hurley Quadrangle, part of Pike County.
27. Hyden Quadrangle, parts of Leslie, Clay and Perry Counties.
28. Inez Quadrangle, parts of Lawrence, Martin and Johnson Counties.
29. Ironton Quadrangle, small portion of Greenup County, Kentucky.
30. Jefferson County, 40 cents each.
31. Kenova Quadrangle, parts of Greenup, Boyd, Carter, Lawrence and Elliott Counties.
32. Kosmosdale Quadrangle, parts of Jefferson and Bullitt Counties.
33. Little Muddy Quadrangle, parts of Butler and Warren Counties.
34. Lockport Quadrangle, parts of Owen, Henry, Shelby and Franklin Counties.
35. London Quadrangle, parts of Rockcastle, Pulaski and Jackson Counties.
36. Louisville Quadrangle, parts of Jefferson and Bullitt Counties.
37. Madisonville Quadrangle, parts of Hopkins, Muhlenberg and McLean Counties.
38. Mammoth Cave Quadrangle, parts of Edmonson, Barren, Warren and Hart Counties.
39. Manchester Quadrangle, parts of Jackson, Owsley, Clay, Leslie, Laurel, Perry, Breathitt and Knox Counties.
40. Mattewan Quadrangle, part of Pike County.
41. Monticello Quadrangle, parts of Wayne, Russell and Pulaski Counties.
42. Morganfield Quadrangle, parts of Union and Webster Counties.
43. Naugatuck Quadrangle, parts of Martin and Lawrence Counties.
44. Newburg Quadrangle, parts of Henderson and Daviess Counties.
45. New Haven Quadrangle, parts of Union County.
46. Nolansburg Quadrangle, parts of Harlan County, Ky., and Lee County, Va.
47. Nortonville Quadrangle, parts of Hopkins, Muhlenberg and Christian Counties.
48. Owensboro Quadrangle, parts of Daviess County.
49. Paintsville Quadrangle, parts of Lawrence, Johnson, Morgan and Magoffin Counties.
50. Pikeville Quadrangle, parts of Pike and Floyd Counties.

51. Pound Quadrangle, parts of Pike and Letcher Counties.
52. Princeton Quadrangle, parts of Caldwell and Lyon Counties.
53. Prestonsburg Quadrangle, parts of Johnson, Floyd and Magoffin Counties.
54. Prospect Quadrangle, parts of Jefferson and Oldham Counties.
55. Providence Quadrangle, parts of Crittenden, Union, Webster, Caldwell and Hopkins Counties.
56. Regina Quadrangle, part of Pike County.
57. Richmond Quadrangle, parts of Jessamine, Fayette, Madison, Estill, Jackson and Garrard Counties.
58. Salyersville Quadrangle, parts of Menifee, Morgan, Wolfe, Magoffin and Breathitt Counties.
59. Sebree Quadrangle, parts of Henderson and Webster Counties.
60. Shawneetown Quadrangle, part of Union County.
61. Sutherland Quadrangle, parts of Daviess, McLean and Ohio Counties.
62. Taylorsville and LaGrange Quadrangle, parts of Jefferson, Bullitt, Suencer, Shelby and Oldham Counties, Kentucky.
63. Tell City Quadrangle, parts of Hancock and Daviess Counties.
64. Troublesome Quadrangle, parts of Perry, Breathitt and Knott Counties.
65. Uniontown Quadrangle, parts of Union and Henderson Counties.
66. Whitesburg Quadrangle, parts of Letcher and Knott Counties.
67. Whitesville Quadrangle, parts of Daviess, Hancock and Ohio Counties.
68. Williamsburg Quadrangle, parts of McCreary, Whitley, Pulaski, Laurel, Knox and Bell Counties, Kentucky, and Scott, Campbell, Claiborne Counties, Tennessee.
69. Williamson Quadrangle, parts of Pike and Martin Counties, Ky.

DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

KENTUCKY GEOLOGICAL SURVEY
WILLARD ROUSE JILLSON
DIRECTOR AND STATE GEOLOGIST



EXPLANATION

HORIZONTAL CONTROL COMPLETED	╳
TOPOGRAPHIC FIELD WORK PARTLY COMPLETED	EKRON
TOPOGRAPHIC FIELD WORK COMPLETED MAPS IN COURSE OF PUBLICATION	FRANKFORT
MAPS PUBLISHED PRIOR TO JULY 1 1912	SEBREE
MAPS PUBLISHED SINCE JULY 1 1912	POUND
TOPOGRAPHIC MAPS AND GEOLOGIC FOLIOS PUBLISHED	47 LONDON

KENTUCKY GEOLOGICAL SURVEY AND U. S. GEOLOGICAL SURVEY
IN COOPERATION

INDEX MAP
SHOWING
PROGRESS OF TOPOGRAPHIC SURVEY
TO
JULY 1, 1923

Area of Kentucky		40,598 sq. miles
" mapped to	June 30, 1923,	19,893 " "
" unmapped on	" " "	20,705 " "

ORDER ATLAS SHEETS BY NAMES PRINTED IN RED ON THIS MAP
NO OTHERS ARE PUBLISHED

INDEX

Adair County:
  Map, 165, 178, 209
Agricultural and Mechanical Associations, Early:
  Fayette County; Louisville; Shelby, Henry and Oldham Counties; Bourbon County; Carlisle County; Franklin County; 1, 7
Agriculture, Labor and Statistics, Report of, 127
Airdrie Furnace, *Report*, 59, 128
Allen. Joseph H: *Memoir*, 45; 85
Allen, Risden T., 85; map, 167
Allen County:
  Oil, 123, 139, 153; oil and gas, 79, 110; geology, 79, 80, 95, 153; map, 79, 80, 165, 178
Althouse, H. W., 85
American Bison, *Memoir*, 13, 45
Anderson, F. Paul, 85
Anderson County:
  Diagram of section, 163; map, 165, 178
Andrews, E. B., 85
Antiquity of Caverns and Cavern Life of Ohio Valley, *Memoir*. 13, 45, 138
Apples, cultivation of, 54
Arnold, Ralph, 85
Artesian Well, Dupont's, 140
Ashburner, C. A., 86
Ashland and Olive Hill Clay Districts, *Report*, 71, 94
Ashley, G. H., 86, 149, 150, 153, 154
Asphalt, Petrolium and Natural Gas in Western Ky., *Report*, 65, 131
Asphalt Rock, 67, 71, 78, 89, 94, 99, 110, 112, 113, 118, 129, 131, 134, 141, 208; bibliography, 78
Astronomical Statistics, 72, 108 208.
Audubon, John James, 86
Averitt S. D., 86, 97; map, 172, 175
Ayres, H. R., map, 160, 167, 176, 179
Ayrs, O. L., 86, 104.

Bacon, R. F., 87
Bagby, F. H., 87
Bain, Harry Foster, 87
Ballard County:
  Geology, 62; map, 165, 179
Barclay, Robert H., 26
Barker, Elihu, 87
Barren County:
  Botany, 44, 58; Oil and gas, 79, 98; geology, 79, 80, 90, 95; earthquake, 86; onyx, 103; map, 79, 80, 165, 179
Barrens, The, Geology of, *Report*, 131, 138
Barton, John Earle, State Commissioner of Geology and Forestry: 29, 32-34; *Report*, 77-81; maps, 163
Barytes and Associate Deposits, *Report*, 67, 100; 70, 101, 107, 144
Base Line, Tracing of, *Report*, 121
Bassler, Ray S., 87
Bath County:
  Coal 44; geology, 61, 119, 123; iron ores, 117, 151; meteorite, 124, 125; map, 61, 166, 180
Bath Furnace, *Report*, 124, 125, 144
Beachler, Charles E., 87
Beattyville Quadrangle: 210
Beckham, Charles Wickliffe, 12, 19; *Report*, 60
Beckham, Gov. J. C. W., 23
Beirne, P. O., map, 169
Bell County:
  Timber, 48, 58; geology, 48, 124, 127; resources, 51; Log Mountain and Clear Creek, 63; coal, 68, 94; map, 63, 166, 180
Bennett, Frank, 87; map, 174
Bernstadt, Swiss Colony, 53
Berry, E. W., 87, 88, 150
Bertsch, F. W., 37; maps, 169, 174
Beyley, W. S., 135
Big Bone Lick, 120
Big Sandy Valley: 26, 46, 48, 123, 128; *Report*, 66, 86, 93, 207; Report, 70, 107; map, 72, 160, 161; Norton coals, 85; coal and iron, 88; coal, 66, 80, 104; oil and gas, 114; regional history 115, 116; geological diagram, 162; see counties of the Valley

Big Sandy Valley, regional history, 115, 116
Big Stone Gap Coal Field, *Report*, 91, 106, 134; 139, 150
Bird and Animal Clubs, 101
Birds of Nelson County, *Report*, 60
Bison, The American, *Memoir*, 13, 45
Bissell, J. L. 37; maps, 165-170, 171, 174
Blackburn, Gov. Luke P., 15, 16
Blake, W. P., 88, 106
Blauvelt W. H., *Report*, 71, 88
Blenkinsopp, Lawson, 88
Bluegrass Region: Water resources of, 123, 132, 154; geography, 38
Bolster, R. H., 154
Boone, Daniel 115
Boone County:
  Geology, 131; glacial ice, 141; map, 166, 180 209
Botanical *Report*, 19, 58
Boulders, sources of, 138
Bourbon County:
  Map, 166, 180
Bowker, R. R., 85
Bowling Green Quadrangle: 210
Boyd, C. R., 88
Boyd County:
  Foresters, 44, 58; iron ores, 44, 57, 127; geology, 45, 57, 93; glaciers, 148; industries 161; map, 61, 72, 166, 180, 181
Boyle County:
  Timber, 50; fossil fishes, 96; geology, 98; map, 55, 166, 181, 209
Brachiopoda, Richmond group, 98
Bracken County:
  Map, 166, 181, 209
Bradley, Frank H., 88
Breathitt County:
  Geology, 48, 58, 60, 80, 81, 106, 107, 127, 209; coal, 68, 75, 81, 100, 208; oil and gas, 79, 111; maps, 79, 80, 159, 167, 181
Breckinridge County:
  Timbers, 46, 58; oil, gas and asphalt, 67, 99; plant food supplied to soil, 71; Cannel coal, 48, 59, 130; geology, 131; diagram coal measures, 161; map, 167, 181, 209
Brewer, Wm. H., 88
Briggs, C. M., 92
Brinsmade, Robert B., 88
Brock, Hiram, 35
Brown, C. B., 88, 144
Brown, Gov. John Young, 17
Browning, Iley B., 30; *Report*, 76, 80, 88, 136; maps, 167, 171, 172
Brownsville Quadrangle: 210
Brunner, Otto, 52, 53
Bryant, J. Owen, 30; *Report*, 73, 89
Bryson, John, 89
Bucher, Walter H., 36, 89
Buckhorn Quadrangle: 210
Buckwheat, 46, 56, 57, 64
Building Stones and Clays, 94
Building Stones of Ky., *Report*, 38, 83, 135, 207
Bullitt County:
  Geology, 131; map, 181
Burchard, E. F., 89, 151; map, 167
Burke, R. T. Avon, 89; maps, 172, 174, 175
Burke, W. E., 89
Burroughs, E. H., 90
Burroughs, Wilbur G., 36, 38; *Report*, 82, 90, 207
Bushnell, T. M., 85, 90
Bussey, J. B., 13
Butler County:
  Geology, 46, 59, 95, 127; map, 181
Butts, Charles, 30, 34, 37, 38, 152; *Report*, 75, 76, 79, 80, 82, 90, 207; maps, 163, 165, 170
Byrem, Lawrence, 90

Caldwell, Wm. B., Jr., 12; *Report*, 49, 50, 59, 90, 208
Caldwell County:
  Topography, 42; lead, 45, 130; timber, 49, 58; limonite ores, 50, 59, 90, 208; coal, 68; oil and gas posibilities, 82, 145; geology, 95; Farmersville Dome, 145; map, 182
Calhoun Quadrangle: coal, 67, 69, 109, 208; oil, 67; diagram, 163; 210
Call, R. C., 91, 108
Calloway County:
  Geology, 62; map, 167, 182
Campbell, M. R., 91, 149, 150, 152, 153, 155
Campbell County:
  Geology, 131; map, 167, 182, 209
Campbellsville Anticline, 113
Cann, Stuart, 52

Cannel Coal District: Breckinridge, *Report*, 48, 59, 130; Chinn's Branch, *Report*, 50, 58, 93; 105; 127
Carbon Black Industry in Ky, 115
Carlisle County:
  Map, 182, 183
Carr, Lucien, 13; *Memoir*, 45, 55
Carroll, John S., 37
Carroll County:
  Meteorites, 118; geology, 131; map, 167, 183, 209
Carter County:
  Topography, 42, 43, 121; coal, 44; diagram coal measures, 161; forests, 44, 58; iron ores, 44, 57, 127; geology, 45, 57, 93, 123; industries 161; map, 61, 72, 159, 167, 183
Casey County:
  Map, 183
Casseday, S. A., 91
Cave Explorations in Ky., *Report*, 82, 126; 118; 124; 138; see Mammoth Cave; Colossal Cavern.
Cave men, Kentucky, 128
Cave-in-Rock Quadrangle: 210
Caverns of Ohio Valley, Antiquity of, *Memoir*, 13, 45, 138
Caves and Licks of Lower Ohio Valley, 126
Cement materials, 150, 152
Centennial Exposition of 1876, *Report*, 50
Central City Quadrangle: coal, 67, 69, 109, 208; oil, 67; soil survey, 71; diagram 163; 210
Chamberlin, T. C. 91
Chauvenet, W. M., 91
Chemical Analyses: *Reports*, 19, 26, 42-43, 44-47, 50, 56, 59, 63, 64, 66; 67, 73, 98, 126, 131, 132, 134, 152, 153, 208
Chester Series: in Western Ky., *Report*, 76, 143; 31, 76; 145
Christian County:
  Coal 68, 98; soil survey, 85, 90; geology, 95; meteorite, 124, 142; zinc, 146; map, 167, 183, 209
Christy David, 92
Cincinnati: Island, Antiquity of, 124, 125; anticline, 98, 99; group, 109, 145; fossils, 143; glacial dam, 148
Cincinnati E. & W. Quadrangle: 210
Clapp, F. G., 91
Clark, John Mason, 92
Clark County:
  Geology, 56, 119, 123; map, 56, 167, 184, 209
Clarke, F. W., 155
Clark, Gov. James, 1, 2
Clay County:
  Coal, 73, 76, 107, 136, 208; map, 184
Clay Deposits of Ky., *Report*, 38, 82, 135, 207
Clays, Fire, and Fire Clay Industries of Northeastern Ky., *Report*, 71, 94, 96, 117; 125, 133, 208
Clays, Pottery, *Report*, 51
Clays, Technology and Analyses, *Report*, 71, 96, 208
Clays and Building Stones, 94
Clays and Industries, Ashland Districts, *Report*, 71, 94
Clays in Several Parts of Ky., *Report*, 66, 100, 208; 102, 103, 135, 155; 26, 94; analyses, 44, 47, 50, 57, 59, 63, 64, 66
Cleland, H. F., 92
Clinton conglomerate and wave marks, 98
Clinton County:
  Coal 44, 129; geology, 63, 120, 129; map, 167, 184
Coal, fossil flora of, 43
Coal, 67, 93; Geology, 209; map, 174, 200, 201.
Coal, Kentucky River, see Kentucky River.
Coal, Licking Valley, see Licking Valley.
Coal Beds, Tradewater River Region, *Report*, 27, 68, 102, 208
Coal Beds, Tug Fork Region, *Report*, 67, 93, 163
Coal District, Black Mountain, 96
Coal Field, Big Stone Gap, *Report*, 91, 106, 134; 139, 150
Coal Field, Eastern, *Report*, 19, 57, 58, 127; 131; map, 162
Coal Field, Eastern, Soil Survey, *Report*, 71, 117
Coal Field, Flora, Western Ky., *Report*, 83, 129
Coal Field, Jellico, 97
Coal Field, Pineville Gap, *Report*, 27, 68, 94, 141, 208
Coal Field, Upper Cumberland, *Report*, 68, 107, 208; map, 160
Coal Field, Western, Geography of, *Report*, 38

Coal Field, Western, *Report*, 27, 19, 46, 48, 49, 58, 59, 69, 127, 128, 130, 131
Coal Fields, The Allegheny, eastern side, 85
Coal Fields, Eastern and Western, Former Connection of, 125, 138
Coal Fields, Kentucky, 115
Coal Fields, Keys to, 129
Coal Industry, Ky., *Report*, 38, 114, 116, 207
Coal Measures, irregularities of floor, 141
Coal Region, Eastern Ky., 122
Coal Region, Maps of, 157-163
Coal Seams, Paralleism of, 85
Coal Washing, *Report*, 51
Coals, Analysis and Heat Value of, *Report*, 67, 134
Coals, Analysis of, in Western Field, *Report*, 73, 107
Coals, Analysis of Samples, 98; see Chemical Analyses.
Coals, Bibliography, and Production, Ky., *Report*, 79, 111
Coals, Big Sandy Valley, *Report*, 66, 93; 93, 207; Coals of Upper Big Sandy and Headwaters North Fork Ky. River, *Report*, 70, 107
Coals, Calorific Properties of, 85
Coals, Clover and Poor Fork, *Report*, 31, 76
Coals, Goose Creek, 106
Coals, Licking Valley, *Report*, 27, 67, 93; 71
Coals, The Low Sulphur, *Report*, 79, 110
Coals, Lower Measures, Western Border of Eastern Field, *Report*, 27, 67, 124; map, 160; 44
Coals, Quicksand Creek Region, *Report*, 68, 100, 208; 27
Coals, Steam Tests in, 130
Coals, Stinking Creek, and Geology, *Report*, 34, 77
Coals, Three Forks of Ky. River, *Report*: See Ky. River
Coals, Ultimate analyses of, 126
Coals: various and sundry, 85, 86, 88, 90, 92, 95, 97, 100, 118, 122, 123, 127, 129, 131, 133, 134, 136, 137, 151, 208
Coke, Manufacture of, *Report*, 71; 88, 208; 64, 85
Collum, R. E., 92
Colossal Cavern, 91, 108, 118
Conrad, Timothy A., 92
Conservation of Natural Gas in Ky., 114
Contributions to Ky. Geology, *Report*, 80, 112, 207; 34
Cooper, Thomas, 92
Cornettsville Quadrangle: 210
Cotton, 105, 106, 136
Counties, Maps of: List of, 165-176; available maps, 209-211; status of mapping in counties, 177-205.
Counties covered by topographical sheets, 210, 211; see various quadrangles, also counties. Counties having no official maps, 177
"County Surveys" or "County Report" (Procter), 19, 20, 27
Cox, Austin P., 92
Cox, Ben B., 37
Cox, Edward T., 92, 93
Cozzens, Isaacher, 93
Crandall, Dr. Albert R., 12, 19, 20, 26; *Report*, 44-48, 50, 51, 57, 58, 60, 61, 63, 66-68, 93-96, 208; maps, 159, 160, 162, 166, 168, 173, 174, 176
Crider, A. F., 30, 151; *Report*, 70, 71, 73-75, 94, 208; maps, 170, 171
Crider, H. D., map, 173
Crittenden, Ann, 37
Crittenden County:
  Topography, 42, 121; lead, 45, 130; timber, 49, 58; coal, 68; geology, 95, 145; metamorphic rocks, 96; map, 168, 184, 209
Crouse, C. S., 37, 38; *Report*, 81, 94
Crump, Malcom H., 30; *Report*, 71, 94
Cumberland Coal Field, Upper, *Report*, 68, 107; 27
Cumberland County:
  Timbers, 48, 58; geology, 116, 129; map, 168, 185, 209
Cumberland Gap, *Report*, etc.: railroad, 46, 62, 130; region, 48, 128, 138; iron ores, 48, 57, 127; geographical and commercial, 62; coal, 86, 103, 134, 150
Cumberland Gap Quadrangle: 210
"Cumberland River Ores," *Report*, 50, 59; 90, 208
Cumberland Valley, *Report*, 96, 122, 124; geology, 48, 127; resources, 51; map of upper, 160

Cumpton oil pool, 128
Currier, Louis Wade, 37, 38; *Report*, 83, 95, 207
Cusick, J. Forest, 37

Daddow, S. H., 95
Darnell, J. L., 85
Darton, H. W., 153, 154
Davie, W. J., 95
Daviess County:
  Geology, 69, 131; coal, 69; map, 185
Davis, Dr. Darnell H., 37, 38; *Report*, 82, 95, 207
Davis, John F., 158
Davis, William J., *Report*, Fossil Corals, 61, 95
Dawson Springs Quadrangle: 210; geology, 73, 94
Day, David T., 95
Decker, J., *Report*, 54
De Friese, LaFayette H., *Report*, 46, 48-50, 58
Demaret, Leon, 95
Denny, Samuel A., 26
Diamond: Genesis of the; *Report*, 62, 95; Field in Kentucky (?), 95
Dielasma and Zygospia, of lower carboniferous, 87
Diller, J. S., *Report*, 61, 62, 95, 96
Dilworth, J. B., 96
D'Invilliers, E. V., 96, 122, 124; map, 166
Dix River Water Power, *Report*, 27, 69, 99, 100, 208
Dole, R. B., 154
Douglas, E. M., 149, 150
Drainage Problems, *Report*, 114; 83, 117, 207
Drake, Daniel, 96
Drakesboro Quadrangle: 210; coals, 74, 94; geology, 74
Dudley, William L., 96
Dunmor Quadrangle: 210; coals, 74, 94; geology, 74
Dupont's Artesian Well, by J. Lawrence Smith, 140

Eakins, L. G., 96
Earlington Quadrange: 210; geology, 73, 94
Earthquake phenomena, 101; New Madrid, 101, 113
Eastbrook, A. H., 97
Eastman, Charles R., 96
Eastman, Harry D., 26, 30; *Report*, 71, 96
Eckel, E. C., 96, 150, 152
Economic Papers on Kentucky Geology, *Report*, 37, 81, 113, 207
Edmonds, Richard H., 96
Edmonson County:
  Botany, 44, 58; geology, 46, 59, 73, 89, 95, 127, 162; diagram lower coal, 161; map, 185
Eldridge, George H., 97, 149
Elkhorn Coal Corporation, 97
Elkhorn Coal Field, 141, 146, 151; 97
Elliott County:
  Geology, 61, 95, 96; peridotite, 61, 95, 96, 150; dikes, 67, 93; Sandy Hook anticline, 113; oil and gas, 113; map, 61, 168, 185
Ellis, Arthur J., 79
Emmons, Ebenezer, 97
Emmons, S. F., 97, 150
Emmons, Wm. H., 97
Estill County:
  Coal, 44; Bedford fauna, 98; Irvine oil field, 78, 139, 140, 153; map, 168, 185
Estillville Folio, 155
Estillville Quadrangle: 210
Evans, A. W., 97
Evans, H. A., 97
Evolution, its relation to geology, 114

Faber, C. L., 97, 126
Fales, J. C., 20, *Report*, 98; maps, 166, 173
Falls of the Ohio: Preglacial Channels at, 89; new fossils at, 93
Fauna: Bedford, at Irvine, 98; Rogers Gap, 99; Devonian shale, 102; Chester group, 145
Fayette County:
  Geolgy, 125; Trenton rocks of Lexington, 126, 145; map, 186
Fellmer, E. A., 19; portrait, 17
Fenneman, N. M., 98
Fieldner, Arno C., 98, 137
Filson Club, 144
Fire Clays and Industries of Northeast Ky., *Report*, 71, 94, 208
Fischer, Moritz, 26, 28
Flax and Hemp, Culture of, *Memoir*, 13, 51
Fleming, Senator, 23

Fleming County:
  Geology, 61, 119; map, 61, 168, 186
Flora, Western Ky. Coal Field, *Report*, 83, 129; Lincoln County, 97
Floyd County:
  Geology, 51, 93, 209; coal, 68, 100; Right Middle Creek, 78, 109; Salt Spring, 115; map, 168, 186
Fluorspar Deposits: *Report*, 38, 83, 95, 207; *Report*, 66, 100; 26, 70, 87, 89, 97, 101, 107, 113, 118, 143, 150
Foerste, August F., 26, 30; *Report*, 66, 68-70, 98-100, 128, 208
Fohs, F. Julius, 26, 30; *Report*, 66-70, 100, 101, 208; maps, 175
Forest and Mineral Resources of Ky., *Report*, 34, 77-80
Forestry and Geology, State Board of, 22, 29, 30-36, 39, 77-81
Fossil Brachiopods, *Memoir*, 13, 45, 138
Fossil Corals, Kentucky, *Report*, 61, 95
Fossil faunas, 117
Fossil flora, 43, 87, 88, 109, 115, 119
Fossil Shells, Kentucky, *Report*, 63, 128, 208
Fossils: crinoids, 91, 126; fish, 96, 125; mollusca, 43, 92; skate, 96; silurian, 87, 99, 100, 145; in sandstone, 102; 99, 105, 117, 121, 139, 140, 142, 145, 146, 171
Fossils: elephant, 101: mastodon, 120; mammoth, 142; Blue Lick, 142
Fossils and Rocks of Central Kentucky, *Report*, 55, 119
Foster, J. W., 101
Franke, Karl L., 52
Frankfort, The Region About, *Report*, 82, 114
Frankfort Quadrangle: 210
Franklin County:
  Geology, 46, 74, 117, 125, 129, 131; soils, 74, 125; region about Frankfort, 82, 114; map, 168, 186, 187
Frasure, J. M., 37
Freeman, Henry C., 101
Fuller, Myron L., 101, 153, 154
Fruits, cultivation of small, 54
Fulton County:
  Geology, 62; map, 187
Funkhouser, Dr. W. D., 37, 38; *Report*, 101, 207

Galena deposits, Origin of, 46, 138
Gallatin County:
  Geology, 131; map, 169, 187, 209
Gannett, Henry, 153
Gannett, S. S., 150
Gardner, James H., 26, 151; *Report*, 66, 69, 101, 102, 208
Garman, Samuel, *Report*, 56
Garrard County:
  Botany, 55; geology, 55, 120; diagram of a section of, 163; map, 55, 169, 187
Gas, Natural: conservation of, 114; handbook, 145; 78, 79, 90, 97-99, 110-114, 118, 131, 134, 148, 152
Gas, Natural, in Western Kentucky, *Report*, 65, 131
Gas and Oil, Ky.—Appalachian Field, *Report*, 80, 161; 101
Gas and Oil, Record thirty-six wells, *Report*, 70, 107
Gas and Oil Accumulation, *Report*, 78, 110
Gas and oil areas, map embracing, 157-163; 209
Gas and Oil Fields of Eastern and South Central Ky., *Report*, 67, 128; 110, 118
Gas and Oil Industry, in Ky., *Report*, 78, 110; manual for, 85
Gas and Oil Possibilities, Western Ky., *Report*, 67, 101
Gas and Oil Resources of Ky., *Report*, 77, 80, 111, 112, 207
Gas and Oil Sands of Ky., *Report*, 65, 107; 91, 92
Gas Fields of Eastern Ky., *Report*, 78, 110
Gas Gasoline in Ky., Natural, 79
Gavin, Martin J., 102
Geish, W. J., 102, 125
General Account of Ky., *Memoir*, 13, 138
Geography of Jackson Purchase Region, *Report*, 38, 82, 95, 207
Geography of the Blue Grass, *Report*, 38
Geography of the Kentucky Knobs, *Report*, 38, 207

Geography of the Mississippi Plateau, *Report*, 38
Geography of the Mountains of Ky., *Report*, 207
Geography of the Western Coal Field, *Report*, 38
Geological Maps: State, 157-159; parts of State, 159-161; geological sections, diagrams, etc., 161-163; available copies, 207-211
Geological Research in Ky., *Report*, 38, 83, 115, 207
Geological Survey, Kentucky State: history, 1-41, 114, 115, 147; *Reports*, 41-83; maps of counties, 165-176; status of mapping in counties, 177-205; available maps and reports, 207-211.
Geological Survey, United States, see U. S. Geological Survey.
Geology, Contribution to Kentucky, *Report*, 80, 112, 207
Geology, Economic Papers on Kentucky, *Report*, 37, 81, 113, 207
Geology, General, books on, by: Shaler, 12, 138; Ries, 135; Schuchert, 137; Mease, 123; Cleland, 92; Hasse, 105
Geology, Kentucky, Economic Papers on, *Report*, 37, 81, 113, 207
Geology and Forestry, Department of, 22, 29, 30-36, 39, 77-81
Geology of Kentucky, *Report*, 34, 77
Georgetown Quadrangle, 210; geology, 70, 125, 207; map, 70, 72, 161
Giles, Albert W., 102
Gilmore, Charles R., 26
Girty, George H., 102
Glaciation in Ky., 141; boundary of, 147, 148; 149
Glass Sands of Ky., *Report*, 37, 81, 135, 207; industry, 89, 151
Glenn, Dr. Leonidas C., *Report*, 68, 82, 102, 103, 207, 208; 26, 36, 37, 150, 153
Goff, John, 26
Golconda Quadrangle: 210; geology, 37, 81, 145, 207
Goode, R. U., 149, 150
Goose Creek Coals, 106
Gorby, S. S., 103
Grabau, A. W., 103
Grant County:
  Map, 169, 187, 209
Grasty, J. S., 103, 144
Graves County:
  Geology, 62; soils, 117; map, 169, 187
Graves-Walker, A. F., 103
Grayson County:
  Geology, 46, 59, 73, 89, 113, 127; timbers, 46, 58; map, 169, 188
Green County:
  Possibility of oil, 112; map, 169, 188, 209
Green River: 136; diagram of a section of, 162
Greenup County:
  Topography, 42, 43, 49, 121, 137; forests, 44, 58; iron ores, 44, 57, 127; geology, 45, 57, 93; diagram coal measures, 161; industries, 161; map, 72, 159, 169, 188, 189
Greibe, W. J., maps, 175
Grider, W. U., 26
Griffen, A. M., 104
Griffith, W. T., 104
Grover, N. C., 104, 154, 155
Grunigen, Johann von, 53
Gurley, F. E., 104

Haddix-Coalburg Geosyncline, 116
Hall, James, 104, 144
Hall, M. R., 154
Hall, W. E., 154, 155
Haly, Percy, 28
Hamor, W. A., 87
Hancock County:
  Topography, 43, 121; timbers, 46, 58; geology, 48, 59, 121, 127; map, 169, 170, 189
Hanging Rock Iron Region, *Report*, 44, 57, 127
Hanna, F. W., 154
Hardin County:
  Geology, 131; map, 189
Harlan Coal Field, 132
Harlan County:
  Timbers, 48, 58; geology, 48, 60, 107, 124, 127; resources, 51; coals, 68, 76, 106, 107, 137, 208; map, 159, 170, 189
Harlan Quadrangle: 210
Harold Quadrangle: 210
Harrison County:
  Geology, 131; diagram coal measures, 161; map, 170, 190, 209

Harrodsburg Quadrangle: 210
Hart County:
  Geology, 46, 59, 127; map, 170, 190
Hartford Quadrangle: 210, geology, 27, 69, 101; soils, 69; soil survey, 71, 117; coal, 208
Harwood, F. H., 105
Haseltine, R. M., 149
Hasse, Adelaide R., 105
Hasson, A. F., 159
Hayes, C. W., 105, 149, 150
Head, Jeremiah, 105
Heliprin, Angelo, 105
Hemp: culture, 46, 51, 57; ashes of, 46, 56, 57, 64; see Flax and Hemp.
Henderson County:
  Geology, 69; coal, 69; diagram coal measures, 161; soil survey Marr's farm, 71; map, 190
Henderson Quadrangle: 210
Hendrie, Charles, 105
Henry County:
  Lead, 46, 129; geology, 62, 120; map, 62, 170, 190, 209
Herrig, L. B., 37
Herrington, L. B., 28
Herzer, H., 12
Hickman County:
  Yellow fever epidemic, 49; geology, 62; fossil flora, 88; map, 170, 190, 191
Hildard, Eugene, 105, 106
Hill, Hargis, 26
Hindman Quadrangle: 210
Historical Society, State, 6
Hitchcock, Charles H., 106
Hodge, James M., 19, 26, 30; *Report*, 60, 67, 68, 71, 73, 75-77, 106, 107, 116, 208; 159
Hodges, H. F., 107
Hoeing, Joseph Bernard, State Geologist: 12, 19, 26, life and works, 29-32; portrait, 31; *Report*, 65, 70-76, 107, 207, 208; maps, 157, 158, 160, 163, 166, 168-173, 175, 176
Hoffman, G. M., 108
Hopkins County:
  Topography, 42; timber, 49, 58; coal, 68, 69; geology, 69, 145; map, 170, 191
Horton, A. H., 154, 155
Hovey, Horace C., 108
Howell, Edwin, 108
Hoyt, J. C., 154
Hudnall, James S., 37; maps, 166, 168, 170-172, 174
Huntley, L. G., 108
Hurley Quadrangle: 210
Hussakof, L., 109
Hussey, John, *Report*, 44, 58
Hutchinson, F. M., 26; *Report*, 67, 69, 109, 208; maps, 163, 157
Hyden Quadrangle: 210

Imlay, Gilbert, 109
Immigration, Bureau of, 18, 21
Inez Quadrangle: 210
Iron, Impurities Occurring with, *Report*, 50
Iron furnace products, 43, 44, 47, 50, 57, 59, 64, 127, 133; Airdrie, 59; bath furnace, 124, 125
Iron Ore: Red River Region, *Report*, 48, 57; "Cumberland River Ores," *Report*, 50, 59; 90, 208; Hanging Rock Iron Region, *Report*, 44, 57, 127; Red River, *Report*, 48, 57
Iron Ores: 44, 47, 48, 49, 50, 57, 90, 91, 97, 99, 117, 127, 129, 131, 133, 146
Irvine Oil District, *Report*, 78, 140; 139, 153

Jackson, H. J., 154
Jackson County:
  Coal, 44; geology, 65, 141; map, 65, 170, 191, 209
Jackson Purchase, see The Purchase.
James, Joseph F., 109
Jefferson County:
  Geology, 75, 89, 90, 121, 131; coral reefs, 103; map, 170, 191
Jeffrey, E. L., 109, 137
Jessamine County:
  Soil survey, 85; Trenton rocks of Highbridge, 126; map, 192, 209
Jillson, Dr. Willard Rouse, State Geologist: life and works, 33-38; *Report*, 77-81, 81-83, 109-116, 161, 207; bibliography, 115; maps, 159, 161, 170, 173, 176
Johnson, R. H., 116
Johnson County:
  Geology, 51, 93, 209; map, 61, 171, 192
Jones, A. L., 13
Jones, Curtis L., 26
Jones, Grov B., map, 172
Jones, R. A., 37
Jones, S. C., 30; *Report*, 67, 69, 71, 74, 117; maps, 165, 168, 169, 175, 176

Kendrick Shale, *Report*, 78, 110
Kennedy, William, 117
Kenova Folio, 155
Kenova Quadrangle: 210; coal, 133, 151; description, 133; geology, 133
Kenton County:
  Geology, 131; map, 171, 192, 209
Kentucky, The Discovery of, 115
Kentucky, General Account of, *Memoir*, 13, 138
Kentucky, A Pioneer Commonwealth, 12, 138
Kentucky, Western, List of mines, mills and operation, *Report*, 66
Kentucky-Appalachian Oil and Gas Field, *Report*, and map, 80, 161
Kentucky-Tennessee Boundary Line, 92
Kentucky as an Oil State, 101
Kentucky Knobs, Geography of, *Report*, 38, 207
Kentucky Maps: State, 157-159; parts of State, 159-161; geological sections, diagrams, etc., 161-163; available copies, 209-211
Kentucky Mountains, Geography of, *Report*, 38, 207
Kentucky Mountains, transportation and commerce, 144
Kentucky River, Three Forks of, *Reports*: improvement in navigation, 49; geology, 60; preglacial, 98; gravel and loam, 125; coals, 67, 106; 27; North Fork: coal, 70, 71, 73, 75, 76, 93, 106, 107, 208; map, 74, 161, 208; Middle Fork: geology, 81, 107, 114; coals, 81, 106, 114, 208
Kentucky River Navigation, a history of, 144
Kentucky River Navigation, Improvement of, *Report*, 49
Keokuk Group, 87
Kevil, Kay K., 26
Kimball, J. P., 117
Kindle, Edward M., 117, 146, 151
King, Warren R., 37, 38; *Report*, 83, 117, 207
Kingsley, J. S., 118
Knobs, Kentucky, Geography of, *Report*, 38, 207
Knott, W. T., 20; *Report*, 60, 118; maps, 176
Knox County:
  Coal, 68, 71, 73, 94, 100, 106, 116, 208; oil and gas, 79, 111, 128, 152; geology, 80, 209; resources, 51; Stinking Creek, 77; map, 79, 80, 171, 192
Kosmosdale Quadrangle: 210
Kroell, Oscar R., 26
Kunz, George F., 95, 96, 118

LaGrange and Taylorsville Quadrangle: 211
Lakes, Quaternary, in Mississippi Basin, 139
Lane, Alfred C., 118
Larue County:
  Map, 192, 193
Laurel County:
  Bernstadt, Swiss Colony, 53; map, 63, 193
Lawrence County:
  Topography, 43, 49, 121, 137; forests, 44, 58; geology, 45, 57, 93; map, 61, 159, 171, 193
Lead and Zinc; *Report*: Central Ky., 26, 65, 70, 107, 125, 208; Northern Ky., 88; Western Ky., 100, 140, 143, 150; 95, 100, 105, 129, 130, 146
Leatherwood Creek: map, 74; coal, 106
Le Couppey, Max., 118
Lee, Wallace, 30; *Report*, 75, 118
Lee County:
  Map, 193
Leighton, M. O., 154
Leith, Charles K., 118
Leonard, Wm. C., 118
Lequereaux, Leo, 9; *Report*, 43, 119
Lesley, Joseph P., *Report*, 44, 118, 138; map, 162
Leslie County:
  Geology, 60, 107; coals, 76, 106, 208; map, 171, 193
Leslie, Gov. Preston H., 10
Letcher County:
  Resources, 51; geology, 60, 107; Coal, 68, 75, 94, 98, 208; map, 75, 159, 171, 194
Leverett, Frank, 119, 149
Lewis, Joseph G., 26
Lewis County:
  Resources, 67, 101; geology, 27, 39; map, 194
Licking Valley: coal, 67, 71, 93, 106, 123; erratic pebbles, 140; clay, 71, 208; map, 160; map of Upper, 72, 161

Licks and Caves of Lower Ohio Valley, 126; salt licks and springs, 143
Lignite, Coal and Peat, 151, 152
Limestone: Oolitic of Warren County, *Report*, 71, 94; 99, 100; 59, 64
Limonite Ores, *Report*, 50, 59, 90, 208
Lincoln County:
  Saaner colony, 53; botany, 55; geology, 55, 120; flora and geology, 97; map, 55, 171, 194
Lindgren, W., 151
Linney, William M., 12, 19, 20; *Report*, 50, 55, 56, 60-62, 119, 120; maps, 166, 169-171, 173, 175, 176
Lithographic stone, 97, 143
Little Muddy Quadrangle: 210; coals, 74, 94; geology, 74
Livingston County:
  Lead, 45, 130; geology, 95, 145; map, 171, 194, 209
Lloyd, John Uri, 120
Locke, John, 92, 120
Lockport Quadrangle: 210
Logan, William E., 120
Logan County:
  Geology, 95; map, 171, 194
London Folio, 155
London Quadrangle: 210
Loughlin, G. F., 120
Loughridge, Dr. R. H., 19, 20, 160; *Report*, 62, 63, 120; map, 167, 173
Louisville: 89; river and harbor, 108, 109; fossils, 139; Davis fossil corals, 61; Dupont's artesian well, 140; crinoids, 140; quadrangle map, 210; see Jefferson County.
Lounsbury, Clarence, 89, 120; maps, 174
Lucas, F. E., *Report*, 71
Lyell, Sir Charles, 120
Lyon, Sidney S., 9, 91; *Report*, 42-44, 121; maps, 159, 169, 170, 175
Lyon, Victor W., 121
Lyon County:
  Timber, 49, 58; limonite ores, 50, 59, 90, 208; geology, 95, 145; vivianite, 96; map, 194, 209

McAdoo, J. E., maps, 176
McCallie, S. W., 122
McCracken County:
  Geology, 62; map, 172, 195
McCreary County:
  Oil and gas, 128, 153; soil, 135; map, 173, 195
McCreary, Gov. James B., 28, 29
McCreath, Andrew S., 122, 124; map, 166
Macfarlane, Graham, 122
Macfarlane, James, 122
Maclure, William, 122
McGee, W. J., 122
McHargue, James H., 26
McHenry, Henry D., 53
McLean County:
  Geology, 69; coal, 69; map, 195
McMurray, Dr. K. C., 37
McNamara, Catherine B., 37
Madison County:
  Botany, 55; soil survey, 86, 104; map, 172, 195, 209
Madisonville Quadrangle: 210; coal, 67, 69, 109, 208; oil, 67; soil survey, 71; diagram, 163
Magoffin County:
  Geology, 51, 93, 209; coal, 71, 76, 88, 106, 136; map, 76, 172, 196
Mammoth Cave: Bibliography, *Report*, 83, 116; 91, 101, 102, 108, 118, 120, 123, 124, 136, 140, 141, 142, 146, 147, 162
Mammoth Cave Quadrangle: 210
Manchester Quadrangle: 210
Mapping, Co-operation in, *Report*, 67; 23, 39, 73, 102
Maps of Kentucky: State, 157-159; parts of State, 159-161; geological sections, diagrams, etc., 161-163; of counties, 165-176; status of mapping, 177-205; available copies, 209-211
Marcou, Jules, 123
Marean, Herbert W., 122; maps, 175
Marion County:
  Map, 55, 60; botany, 55; geology, 60, 118; map, 172, 196, 209
Marls: analyses, 44, 47, 50, 57, 59, 64; 132
Marshall, R. B., *Report*, 73, 122; 151-153; map, 159
Marshall County:
  Geology, 62; map, 172, 196
Martel, E. A., 123
Martin County:
  Coal, 67, 93; geology, 209; map, 172, 197

Mason County:
  Geology, 60, 120; soil survey, 89; map, 60, 172, 197, 209
Mather, K. F., 123, 139, 153
Mather, William Williams, State Geologist: life and work, 2-8; portrait, 5; *Report* made in 1838, 41, 123
Matson, G. C., 123, 132, 154
Mattewan Quadrangle: 210
Mauch Chunk, Status of, *Report*, 78, 110; 112, 113, 115
Mayfield, S. M., 37
Mayo, John C. C., 28
Meade County:
  Oil, gas and asphalt, 67; plant food supplied to soil, 71; geology, 131; diagram coal measures, 161, 163; map, 173, 197, 209
Mease, James, 123
Meek, F. B., 124
Memoirs, published by Survey, 13, 45, 55, 138
Menifee County:
  Geology, 47, 57, 93; map, 173, 197
Menifee gas field, 128, 152
Mercer County:
  Timber, 50; geology, 55, 120; diagram of a section of, 163; map, 55, 174, 198, 209
Merrill, George P., *Report*, 81, 124
Merry, H. R., map, 165
Metamorphic Rocks from Marion, 96
Metcalfe County:
  Map, 173, 198
Meteorite: The Cumberland Falls, *Report*, 78, 81, 124; 108; 118; 124, 125; 142; 144
Middlesboro Region, 86, 88
Miller, Arthur McQuiston, 26, 30, 34, 36; *Report*, 65, 67, 70, 74, 77-80, 82, 124-126, 208; maps, 165, 168, 169, 176
Miller, S. A., 126
Mineral and Forest Resources of Ky., *Report*, 34, 77-80
Mineral Fuels, 152, 153
Mineral Productions in Ky., Recent, *Report*, 114
Mineral Resources of Ky., *Report*, 38, 116, 207
Mineral Waters, *Report*, 79; analyses, 44, 47, 50, 57, 59, 63, 64, 66
Mineral Wealth, Kentucky's, 129
Mines, Department of, in connection with University of Kentucky, 24
Mines, Inspector of, Report for Ky., 129, 130
Mississippi Plateau, Geography of, *Report*, 38
Mississippi River: ancient, 140; elevation of banks, 143; rocks of, 146
Mississippian Formations: in Western Ky., *Report*, 31, 76, 90; series in Eastern Ky., *Report*, 38, 82, 90, 207; West Central, Ky., 90; Pottsville Channel, *Report*, 82, 90; 91; chart, 163; 159
Mitchell, W. C., 12; maps, 169
Mitzakis, Marcel, 127
Monroe, J. A. 12
Monroe County:
  Geology, 95, 116; map, 173, 198, 209
Montgomery County:
  Coal, 44; geology, 56, 119, 123; map, 56, 173, 198, 209
Monticello Quadrangle: 210
Moore, Elwood S., 127
Moore, Lucas, 127
Moore, P. N., 12; *Report*, 44, 46-
Geology, 56, 119; birds, 60; map, 48, 51, 57-59, 127, 128; maps, 162, 169, 170
Moore, William C., 26; *Report*, 68, 128, 208
Mooreman, R. E., 26
Morehead, James T., 1
Morgan County:
  Coal, 44; geology, 51, 93, 118; map, 61, 173, 198
Morganfield Quadrangle: 210
Morris, George W., 37; maps, 171
Morris, Marshall, 128
Morrow, Gov. Edwin P., 36
Mounds of Mississippi Valley, *Memoir*, 55; near Lexington, 88; Prehistoric Remains of Ky., *Memoir*, 13, 45
Muhlenberg County:
  Airdrie furnace, 59, 128; geology, 69; coal, 69, 198, 199
Munn, M. J., *Report*, 67, 128; 152
Mylotte, E., maps, 159, 169

Natural Arches of Ky., 125
Natural Bridges, 92
Natural Gas: see Natural Gas, also Oil and Gas

Natural Gas, Asphalt and Petroleum in Western Ky., *Report*, 65, 131
Natural Gas in Ky., Conservation of, 114; bibliography, 78
Naugatuck Quadrangle: 210
Nelson, N. C., 128
Nelson County:
  Geology, 56, 119; birds, 60; map, 56, 174, 199, 209
Nettleroth, Henry C. E., *Report;* fossil shells, 63, 128, 208
New Haven Quadrangle: 210
New Oil Pools in Ky., *Report*, 83, 115, 207; map, 209
Newberry, J. W., 128
Newburg Quadrangle: 210; coal, 67, 69, 109, 208; oil, 67; diagram, 163
Newton, Henry, 129
Nicholas County:
  Map, 199
Nichols, William M., 26
Nickles, John M., *Report*, 66, 129, 208
Noe, Alfred C., 37, 129
Nolansburg Quadrangle: 210
Nolin River District:
  Geology, 46, 59, 127; topography, 46; map, 73; diagram lower coal, 161
Northrop, John D., *Report*, 79, 129
Nortonville Quadrangle: 210; coals, 74, 94; geology, 74
Norwood, A. J., 41, 130; 132
Norwood, Charles Joseph, State Geologist: 12, 19; life and works, 23-29; portrait, 25; *Report*, 45-49, 59, 65-69, 129, 130, 208; maps, 158, 162, 169, 175
Norwood, Joseph W., maps, 163, 165, 176
Nuttall, Thomas, 131

Ohio County:
  Timbers, 46, 58; geology, 49, 59, 69, 129; coal, 69; Hartford Quadrangle soil, 69; geology, 69; map, 174, 199
Ohio River, History of, 109
Ohio Valley, Geological Account of, 96
Oil, Crude, Ky., The Production of, *Report*, 113
Oil, Crude, New Mèthod of Producing in Ky., *Report*, 81, 114
Oil and Gas, Ky.-Appalachian Fields, *Report*, 80, 161; 101
Oil and Gas, Record thirty-six wells, *Report*, 70, 107
Oil and Gas Accumulation, *Report*, 78, 110
Oil and Gas Areas, Ky., maps embracing, 157-163; 209
Oil and Gas Fields of Eastern and South Central Ky., *Report*, 67, 128; 110, 118
Oil and Gas Industry, in Ky., *Report*, 78, 110; manual for, 85
Oil and Gas Possibilities, Western Ky., *Report*, 67, 101
Oil and Gas Resources of Ky., *Report*, 77, 80, 111, 112, 207
Oil and Gas Sands of Ky., *Report*, 65, 107; 91, 92
Oil District, Irvine, *Report*, 78, 140; 139, 153
Oil Field, Barbourville, 122
Oil Field, Ragland, 128, 152
Oil Field Stratigraphy of Ky., *Report*, 37, 82, 114, 207
Oil Pools in Ky., New, *Report*, 38, 83, 115, 207; maps, 209
Oil Sand: The Wier Sand, *Report*, 79, 111; 91
Oil Shales: Retarding Methods Applied to, *Report*, 81, 94; discussion of, 94; economic aspects of, 94; historical, etc., 102; bibliography, 78; 38, 78, 110, 113, 142
Oil State, Kentucky as an, 101
Oils, Crude, Eastern Ky., The Production of, 113
Oils: sundries, 86, 90, 92, 95, 97-99, 103, 111-114, 118, 119, 128, 131
Oldham County:
  Geology, 62, 120, 131; map, 62, 174, 199, 209
Onyx in Barren County, 103
Oolitic Limestone in Warren County, *Report*, 71, 94, 208; 102, 151
Ordovician Rocks and Weir Bryozoa, *Report*. 26, 66, 124, 125, 129, 143, 208; map, 158, 159
Ortmann, Arnold E., 131
Orton, Edward, 19, *Report*, 65, 131
Osborn, C. C., 140

Owen, Dr. David Dale, State Geologist; life and work, 7-10; portrait, 9; family history, 97; *Reports*, 42-44, 131, 132; 41, 47
Owen County:
  Geology, 46, 129, 131; map, 174, 200, 209
Owensboro Quadrangle: 210; geology, 70, 94, 207
Owsley County:
  Coal, 44; coal, 200

Packard, A. C., 13
Page, William Byrd, 12; *Report*, 46, 49, 132; maps, 169, 170
Paint Creek Uplift, *Report*, 79; 113
Paintsville Quadrangle: 210
Paleontological, *Report*, 43, 92; devonian, 117, 146
Palmer, Chase, 132, 154
Pate, W. F., 26
Payne, W. C., 26
Peat, 140, 151
Peck, W. R., 132
Peckham, S. F., 132
Peeples, Benjamin, 92
Pemberton, J. R., 132
Pendleton County:
  Geology, 131; map, 174, 200, 209
Peridotite: of Elliott County, *Report*, 61, 95, 96, 150; in carboniferous rocks, 95
Perry County:
  Geology, 60, 81, 107; coal, 71, 73, 75, 81, 106, 208; Leatherwood Creek, 74, 106; Macies Creek, 74; map, 159, 174, 200
Peter, Dr. Alfred Meredith, 26, 30, 37; *Report*, 56, 57, 59, 63, 64, 132
Peter, Dr. Robert, 7, 8, 9, 12, 19, 21; *Chemical Report*, 19, 42-43, 44-47, 50, 56, 59, 63, 64, 66, 132, 133, 208
Petroleum: *Report*, 48, 78, 131, 133; industry, 87, 95, 132, 134; 87, 90, 97, 110, 111, 118, 132, 134, 136, 138, 148, 152; 63, 64; bibliography, 78
Petroleum, Natural Gas and Asphalt in Western Ky., *Report*, 65, 131
Petroleum in Western Kentucky, *Report*, 65
Phalen, W. C., 30, 151, 155; *Report*, 75, 133
Phosphate Deposits, *Report*, 31, 70, 75, 98, 99; 133; 102, 125, 144, 207
Pike County:
  Coal, 67, 93; geology, 209; map, 174, 200, 201
Pikeville Quadrangle: 210
Pine Mountain Region, 116; fault, 141; map north of, 159; 162
Pineville Gap, Coal Field Adjacent, *Report*, 27, 68, 94, 141, 208
Pipe Lines and Pools, Oil and Gas, map, 80, 161, 209
Pirsson, Louis V., 133
Pirtle, George W., 37; map, 168, 173
Plant Food Supplied to Soils, *Report*, 71
Pogue, Joseph E., 134
Pond and Blackberry Creeks, Maps of, 72, 161
Porter, Senator Nat A., 23
Pottsville Filled Channel of the Mississippian, *Report*, 82, 90; 91
Pound Gap Region, *Report*, 60, 90, 93; map, 160
Pound Quadrangle: 210; 90, 152
Powell, E. D., 54
Powell, Gov. Lazarus W., 7
Powell County:
  Coal, 44; map, 174, 201
Prehistoric Remains of Ky., *Memoir*, 13, 45; see mounds.
Prestonsburg Quadrangle: 210
Princeton Quadrangle: geology, 38, 82, 145, 207
Procter, John Robert, State Geologist: 13, 14; life and work, 15-22; portrait, 17, 20; *Report*, 49, 51-65, 134; *Immigration*, 51-54; maps, 157, 158, 172
Production of Eastern Kentucky Crude Oils, 113
Prospect Quadrangle: 210
Providence Quadrangle: 210
Pulaski County:
  Coal, 44; geology, 63, 93; crinoids, 146; map, 63, 201
Pultz, John L., 134

Purchase, The, or Jackson Purchase: *Report*, timber, 50, 58; *Report*, geology, 62, 120; *Report*, oil and gas possibilities, 82, 144; *Report*, geography, 38, 82, 95, 207; maps, 160, 209
Putnam, F. W., 13

Quadrangle, or Topographical Sheets, 210, 211; see various quadrangles.
Quickel, R. D., *Report*, 67, 134
Quicksand Creek Region Coal, *Report*, 27, 68, 100, 208

Ragland oil field, 128, 152
Rail Roads, Reports on proposed and others: 45, 46, 47, 48, 54, 93, 123, 127, 130, 138, 157, 162
Railway Guide, Geological, 122, 134
Red River, Iron ore region, *Report*, 48, 57
Regina Quadrangle: 210
Renshawe, J. H., 149, 150
Reports by State Geologists: 41-83
Reptiles and Batrachians, *Report*, 56
Rhodes, E. O., *Report*, 79
Rice, G. S., 134
Rice, Thomas D., 135; maps, 175
Richardson, Dr. Charles H., 36-38; *Report*, 81, 83, 135, 207
Richmond Folio, 155
Richmond Quadrangle: 211
Ries, Dr. Heinrich, 36, 38, 149; *Report*, 82, 135, 207
Rivers of Ky., An Improvement of, *Report*, 48
Road Materials of Ky., *Report*, 38
Robertson County:
  Map, 201
Robinson, Dr. Samuel, 136
Rock Oil, Geological Distribution, 85
Rockcastle County:
  Coal, 44; geology, 27, 65, 69, 141; soil survey, 87, 89, 120; map, 65, 174, 201, 209
Rogers, H. Darwin, 136
Rogers, Julia E., 136
Rosel, Alois, 54
Rowan County:
  Coal, 44; resources, 67, 101; geology, 27, 69, 123; map, 72, 175, 201
Russell, Israel C., 136
Russell, J., 136
Russell, Philip G., 30; *Report*, 76, 88, 107, 136, 208
Russell County:
  Map, 202
Russell Fork Basin, 141, 151; fault, 145

Saaner Colony, Lincoln Co., 53
St. Clair, Stuart, 37; *Report*, 78, 81, 140
Salisbury, Rollin D., 91, 137
Salyersville Quadrangle: 211
Sampson, F. A., 137
Sampson, R. J., 132
Sanborn, F., 13
Sandy Hook Anticline, 113
Sandstone, bituminous, 97
Sanford, S., 153
Sauer, Dr. C. O., 37, 38
Sayler, N., 137
Schenk, C., 12; *Report*, 49, 137; *Immigration*, 52; maps, 166, 169
Schoenmann, L. R., maps, 172, 175
Schrader, F. C., 153
Schuchert, Charles, 87, 137
Scott, D. H., 137
Scott County:
  Soil survey, 89; geology, 131; map, 175, 202, 209
Sea Level, Elevations above, Points in Ky., *Report*, 72, 107, 208
Sebree Quadrangle: 211
Sellier, Lucien M., 30; *Report*, 72, 73, 74; maps, 159, 161, 165, 168, 171, 172
Selvig, W. A., 137
Shale, Kendrick, *Report*, 78, 110; waverlain shales, 86, 109, 137
Shaler, Prof. Nathaniel Southgate, State Geologist: life and work, 10-15; portrait, 14; *Memoirs*, 13, 45, 55; *Report*, 44-50, 57-59, 64, 138, 139; maps, 157
Shaw, E. W., 123, 139, 153
Shaw, Joseph S., 26
Shawneetown Quadrangle: 211; geology, 75, 118; map, 76, 161
Shelby, William W., Jr., 26
Shelby County:
  Geology, 62, 120; soil survey, 143; map, 62, 175, 202, 209

Shippen, John P., 139
Shumard, Dr. B. F., 41, 139, 140, 148
Sillman, Benjamin, Jr., 140
Simpson County:
  Geology, 95; map, 175, 202
Sinis, Boyd M., 26
Sinks, Land of, 116
Silurian, Devonian and Irvine Formations of East Central Ky., *Report*, 26, 66, 100, 208
Slate Slide, A., 116
Smith, Geo. Otis, 140
Smith, J. Lawrence: Dupont's Artesian Well, 140
Smith, W. S. Tangier, 140, 143, 149, 150
Soil: *Report*, 67, 208; 71, 117; soils of Ky., 86; origin of soil, 138; analyses of, 44, 47, 50, 57, 59, 63, 64
Soper, E. K., 140
Spencer, J. W., 140
Spencer County:
  Geology, 56, 119; map, 56, 175, 202, 203, 209
Spirit Leveling in Ky., *Report*, 73, 122, 123
Springer, Frank, 140
Squier, G. H., 140
Stadmchenko, T., 146
Stafford, James M., 136
Stanley, Gov. A. O., 32, 33
Steele, G. D., 141
Stevens, R. P., 141
Stevens, W. Le Conte, 141
Stevenson, John J., 141
Stinking Creek, Geology and Coals of, *Report*, 34, 77
Stone, Ralph W., 141, 151, 153
Sullivan, George M., 19, 20; *Report*, 65, 68, 94, 141, 208; maps, 170
Surface Waters of Ky., *Report*, 38, 83, 117, 207
Sutherland Quadrangle: 211
Sutton, George, 141

Talbutt, John H., 12; *Report*, 44, 47, 56, 57, 64
Tassin, Wirt, 142
Taylor, Richard C., 142
Taylor County:
  Campbellsville anticline, 113; map, 175, 203, 209
Taylorsville and LaGrange Quadrangle: 211
Telemeter, Use of, *Report*, 49
Tell City Quadrangle: 211; geology, 70, 94, 207
Tennesseean, A., 142
Theis, C. V., maps, 171
Thiessen, Rheinhardt, 37, 38, 142
Thruston, R. C., Ballard, 19
Tight, W. G., 142, 149
Timber Standing in Ky., *Report*, 79; 50; 58; see timber under various counties; also Tradewater Region, the Purchase.
Todd County:
  Geology, 95; map, 203
Topographical sheets, 210, 211; see various quadrangles.
Tradewater Region Timbers, *Report*, 49, 58
Tradewater River Region Coal Beds, *Report*, 27, 68, 102, 208
Trails, River and Forest, in Western Ky., 112, 113
Trap, Occurrence of, 93
Trenton: and Lower Geological Horizons, *Report*, 70, 99, 207; Stone's River Rocks in Central Ky., *Report*, 70, 98, 207; Phosphate Deposits, *Report*, 10, 99, 207; 126. 145
Trigg County:
  Limonite ores, 50, 59, 90, 208; geology, 95; map, 175, 203, 209
Trimble County:
  Geology, 131; map, 203
Triplett, George V., Jr., 26
Troost, Gerard, 142
Troublesome Creek: geology, 48, 58, 127; map, 75
Troublesome Quadrangle: 211
Trouvelot, L., 13, 157
Tug Fork Coal Beds, *Report*, 67, 93; diagram of a section of, 163
Turner, James W., 142
Tygrett, H. V., 37

Ulrich, E. O., 30, 149, 150; *Report*, 76, 143; maps, 163
Underwood, E., 12
Union County:
  Topography, 42, 121; timber, 49, 58; coal, 68; soil survey, 122; diagram coal measures, 162; map, 175, 203, 204, 209
Uniontown Quadrangle: 211
U. S. Coast Survey in Ky., 49, 132; astronomical stations, 108

U. S. Geological Survey: List of Publications Relating to Kentucky Geology, 149-155; Professional Papers, 119, 150; Bulletins, 150-153; Water Supply Papers, 153-155; Folios, 155; in co-operation with State, 23, 39, 73, 102
Usher, F. C., 143

Van Duyne, Cornelius, 143; maps, 175
Van Rensselaer, J., 143
Van Sant, Rufus H., 28
Vanuxem, Lardner, 143
Vaughan, T. W., 144
Verhoeff, Mary, 144
Verneuil, Ed. de, 144
Vivianite near Eddyville, 96
Volney, C. F., 144

Waggaman, Wm. H., 144
Walcott, Charles D., Director U. S. Geological Survey, 149
Ward, Henry A., 144
Warden, Robert B., 144
Warren County:
  Oolitic limestone, 71, 94, 151; oil and gas, 79, 80, 111; oil pools, 81, 140; geology, 95; soil, 135; map, 79, 80, 111, 175, 176, 204
Washington County:
  Geology, 55, 120; map, 55, 60; botany, 55; map, 55, 60, 176, 204, 209
Water Power: 70, 99, 107; 103, 104; Dix River, *Report*, 17, 69, 99, 100, 208
Water Resources of Bluegrass Region, 123, 132
Water Supply Papers, U. S. Geological Survey, 153-155
Waters, Surface, of Ky., *Report*, 83, 117, 207
Waters, Underground, 103
Watkins, O. R., 92
Watson, Thomas L., 135, 144
Waverlain Formation, East Central Ky., *Report*, 27, 68, 100, 128, 208; shale, 109, 137
Wayman, James, 54
Wayne County:
  Coal, 44, oil and gas, 128, 153; "glaciers", 125; map, 176, 204,
Webster County:
  Timber, 49, 58; coal, 68, 69; geology and coal, 37, 82, 103, 207; soil survey, 71, 117; map, 176, 204, 205, 209
Weller, Dr. Stuart, 36-38; *Report*, 81, 82, 145, 207
Wentworth, C. K.
Wescott, H. P., 145
Wetherby, A. G., 145, 146
Wheeler, George D., 146
Whinery, S., 146
Whitbeck, R. H., 146
White, C. A., 146
White, David, 38, 146, 149, 153
Whitefield, R. P., 146
Whitesburg Quadrangle: 211
Whitley County:
  Resources, 51; geology, 63, 93; meteorite, 78, 81, 124; map, 63, 176, 205
Whittlesey, Charles, 146
Wier Sand, *Report*, 79, 111
Wild Life in Ky., *Report*, 38, 101, 207
Williams, A. B., 37
Williams, H. R., 146, 147
Williamsburg Quadrangle: 211
Williamson Quadrangle: 211
Williamstown meteorite, 108
Wilson, H. M., 149, 150
Winchell, Alexander, 147
Wingate, Cyrus, 1
Wolfe County:
  Geology, 48, 58, 127; map, 176, 205
Woodford County:
  Map, 176, 205
Worthen, A. H., 147
Wright, Dr. Charles W., 147
Wright, G. F., 147, 148, 150
Wright, James E., 26
Wrigley, Henry E., 148
Wyer, S. S., 148

Yandell, Dr. Lunsford P., 41, 139, 148
Yellow Creek Valley, 162
Yellow Fever Epidemic at Hickman, *Report*, 49

Zinc and Lead; see lead and zinc.
Zook, R. T., 148

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

RULE ADO 10

If any b shall be lost or seriou writing made therein, the person to whom it stands charged shall replace it by a new copy, or by a **new set** if it forms a part of a set.

Form L53-10,000-30-Mr.'22

MIT LIBRARIES

3 9080 02414 3593

13893

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
LIBRARY

SIGN THIS CARD AND LEAVE IT in the tray upon the desk.

NO BOOK may be taken from the room UNTIL it has been REGISTERED in this manner.

RETURN this book to the DESK.

FORM L44-5000-5-23